

UNIVERSITY OF LONDON LIBRARY

**THIS BOOK
MUST NOT BE REMOVED
FROM THE LIBRARY**





606147



Digitized by the Internet Archive
in 2026

Accounts and Papers:

35 Volumes.

(16)

Education, France.
Technical Instruction.

Session

19 Nov. 1867 — 31 July 1868.

Vol. LV.

Octavo Portion.

1867-8.

Accounts and Papers.

35 Volume.

(16)

Technical Instruction.
Education, Training.

Session

19 Nov 1867 - 31 July 1868.

Vol. IV.

Octavo Edition.

1867-8.

FRENCH MINISTRY OF AGRICULTURE, COM-
MERCE, AND PUBLIC WORKS.

COMMISSION

ON

TECHNICAL INSTRUCTION,

APPOINTED BY

Imperial Decree, 22nd June 1863.

TRANSLATION OF REPORT AND NOTES.

Presented to both Houses of Parliament by Command of Her Majesty.



LONDON:

PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

1868,

PREFACE TO THE TRANSLATION.

ON the 22nd June 1863, M. ROUHER, at that time Minister of Agriculture, Commerce, and Public Works in the French Cabinet, addressed to the Emperor a letter calling his attention to the great progress made by other countries in arts and manufactures compared with that made by France. He considers that the shows made by different countries in the International Exhibition of 1862 are a convincing proof that though France is not remaining exactly stationary in the production of works of art and taste, in which she has hitherto retained the first place, there is yet danger of her being outrun by her competitors in the race; and to strengthen his argument, he cites the opinion to the same effect of the French jurors of that Exhibition. One of the main causes of this backwardness of the French manufactures in the industrial competition M. Rouher attributes to the deficiency of *Technical*, or *Professional*, or *Special* (for it is called by all these names) instruction; and to provide the remedy he calls upon the Emperor to appoint a Commission to inquire into the condition of this branch of education in France, and to report on the best means of improving it.

This Commission was composed as follows :—

THE MINISTER OF AGRICULTURE, COMMERCE, AND PUBLIC
WORKS, *President* ;

M. MÉRIMÉE, Senator, *Vice-President*.

M. MICHEL CHEVALIER, Senator ;

M. LE PLAY, Councillor of State ;

M. SCHNEIDER, Vice-President of the Council of Improvement
at the Imperial Conservatory of Arts and Trades ;

General MORIN, President of the Council of Improvement and
Director of the Imperial Conservatory of Arts and Trades ;

M. TRESCA, Sub-Director of the Imperial Conservatory of Arts
and Trades ;

M. PERDONNET, Director of the Imperial Central School of
Arts and Manufactures ;

M. BAYLE-MOUILARD, Judge at the Court of Cassation ;

- M. DENIÈRE, President of the Tribunal of Commerce, Member of the Chamber of Commerce of the Seine ;
 M. ARLÈS-DUFOUR, Member of the Lyons Chamber of Commerce ;
 M. J. DOLFUS, Manufacturer at Mulhouse ;
 M. DE BOUREUILLE, Councillor of State, Secretary-General in the Ministry of Agriculture, Commerce, and Public Works ;
 M. JULIEN, Director of Internal Commerce in the same ministry ;
 M. GERVAIS (of Caen), Director of the Superior School of Commerce.

It was considered desirable that the Minister of Public Instruction should be represented on the Commission, and accordingly the two following gentlemen from his office were appointed members of it :—

- M. DANTON, Inspector-General of Public Instruction ;
 M. VIEILLE, Inspector-General of Public Instruction.

By subsequent decisions the following were added to the Commission :—

- M. LEROY, Master of Requests in the Council of State, with deliberative voice ;
 M. F. MONNIER, Auditor in the Council of State, in the capacity of *Secretary* ;
 M. SIMONS, Chief Secretary to the Minister of Agriculture, Commerce, and Public Works, in the capacity of *Assistant-Secretary*.

The labours of the Commission were directed by M. BÉHIC, Minister of Agriculture, Commerce, and Public Works, who succeeded M. ROUHER, and presided at the sittings.

At their sitting on the 11th December 1863, the Commission came to the conclusion that before making any report it would be advisable to take the evidence of persons whom their position and practical experience had rendered most competent to give information on the opportunities for technical instruction already existing, and to suggest means for its development and improvement. The following are the names of the witnesses examined before the Commission :—

- M. MONJEAN, Director of the Chaptal Municipal College, Paris ;
 M. MARGUERIN, Director of the Turgot Municipal College, Paris ;
 M. BAUDIME, Assistant to the Superior of the Christian Brothers' Schools, Paris ;

- M. VICTORIS, Member of the same Order ;
- M. POMPÉE, Founder of the Technical School of Ivry, Principal Director of the Turgot Municipal School, late Member of the Superior Committee of Elementary Instruction for the City of Paris, Vice-President of the Polytechnic Association ;
- M. A. DELAHAYE, Director, Head-Master of the Technical School of Batignolles, and Member of the Council of Head-Masters of the Department of the Seine ;
- M. BARDIN, Professor of Industrial Drawing to the Communal Schools of the City of Paris ;
- M. MEYER, Protestant Minister in Paris, Ecclesiastical Inspector, President of the Apprenticeship Society of the Church of the Confession of Augsburg at Paris ;
- MM. GAUMONT and GUENIED, Editors of the Journal of Technical Education, Paris ;
- Mlle. HAUTIER, Directress of the Municipal School of Drawing in the Rue Nôtre-Dame-de-Lorette, Paris ;
- Mlle. MARCHEF-GIRARD, Directress of the Professional School for Young Girls, Rue De-la-Perle, Paris ;
- M. MAIGNEN, Member of the Society of Saint-Vincent-de-Paul, Director of the Mission of Saint-Vincent-de-Paul, Paris ;
- M. DE COMMINES DE MARSILLY, President of the Industrial Society of Amiens (Somme) ;
- M. S. FERGUSON, (junior), Vice-President of the Industrial Society of Amiens (Somme) ;
- M. LEQUIEN, (senior), Director of the Communal School of Drawing in the Rue Ménilmontant, Paris ;
- M. BERNOT, Director of the School of Industrial Arts and Mines at Lille ;
- M. NOYON, Councillor of the Prefecture of the Seine, Director of the Municipality of the City of Paris ;
- M. THUNOT, President of the Council of Prud'hommes, Paris ;
- M. BADER, Director of the Technical School of Mulhouse (Haut-Rhin) ;
- M. J. J. BOURCART, Manufacturer at Guebwiller, Founder of the Popular Courses of Lectures at Guebwiller (Haut-Rhin) ;
- M. GIRARDON, Director and Founder of the Central School of Lyons, Professor at the School of La Martinière, Lyons ;
- M. LELOUP, Honorary Director of the Upper Technical School of Nantes ;
- M. ROSSAT, Doctor of Science, Head-Master at Charleville (Ardennes) ;
- M. MALET, Superior Officer, Professor at the Imperial Artillery Schools, Douai (Nord) ;
- M. A. GROS, Member of the Legislative Body, Manufacturer at Wesserling (Haut-Rhin) ;
- M. KERN, Minister at Paris of the Swiss Confederation, formerly President of the Council of the Federal Polytechnic School at Zürich ;
- M. GOVIN, Civil Engineer, Paris ;

Mme. PELLEPORT, Directress of the Upper Municipal School,
 Passage Saint-Pierre, Paris ;
 M. HOUEL, Director of the Establishments at Derosne of Cail
 and Co., Paris.

In order to obtain a knowledge of what was being done in other countries two sub-commissions were formed and instructed to inquire into, and report on, the systems of technical education in England and Germany respectively. The first of these was composed of M. VIEILLE, M. LEROY, and M. C. DE FRANQUEVILLE; the second of General MORIN, M. PERDONNET, and M. MONNIER. An abstract of the evidence taken before the Commission, and of the reports of the sub-commission will be given in a separate volume supplementary to this one.

The translation of the following report was made by M. HAUSSOULLIER. In executing it the translator has adhered very closely to the original, and with the exception of some obvious Gallicisms and a few redundancies of expression, it is now reproduced as nearly as possible in his own words. It may be remarked that in English the word "education" is often loosely employed where "instruction" is rather intended; the French, with greater accuracy, rarely use the word *education*, and then only where the whole training of the individual is signified. In accordance with English usage, as well as for convenience of construction, *enseignement* is in this volume often translated education, though perhaps instruction or teaching would be more strictly correct.

The Commission have embodied in their report a series of recommendations of what should be done to extend and develop the present system of technical instruction in France, and have also drafted a bill founded on these recommendations. It has been thought advisable to point out at the end of each section of the report how far the suggestions of the Commission are applicable to, or are anticipated by, the institutions of this country. In the Appendices will be found details of the encouragement offered by the English Government to instruction in science and art, and statistics of their schools and classes.



CONTENTS.

REPORT.

SECTION I.—GENERAL CONSIDERATIONS :

	PAGE
Expediency of obtaining the co-operation of the Minister of Public Instruction - - - - -	11
Development and completeness to be given to primary instruction -	13
<i>Note by the Editor</i> - - - - -	14

SECTION II.—APPRENTICESHIP :

Considerations on the professional and technical instruction of apprentices - - - - -	15
Ordinary apprenticeship - - - - -	16
Societies of Patronage - - - - -	18
Special workshops for apprentices - - - - -	19
Schools established in workshops for apprentices - - - - -	22
School at Lépine - - - - -	23
School at Graffenstadt - - - - -	23
Examination of the law of apprenticeship - - - - -	24
Length of working day for apprentices - - - - -	26
Examination of the law of 1841. Labour of children and lads in small workshops and manufactories - - - - -	27
Necessity of regulating the same - - - - -	27
Necessity for organized inspection - - - - -	30
Schools of Arts and Trades - - - - -	31
Instruction given therein - - - - -	34
Out-door pupils - - - - -	36
Preparatory establishments for schools of Arts and Trades -	37
<i>Note by the Editor</i> - - - - -	39

SECTION III.—TECHNICAL EDUCATION OF WORKMEN :

Divers organizations - - - - -	40
Consequences of the preceding information - - - - -	43
General organization of the instruction to be given to apprentices and workmen - - - - -	44
Principal divisions in teaching workmen - - - - -	48
Payment by pupils - - - - -	49
Public lectures - - - - -	51
Agricultural instruction - - - - -	52
Industrial education of girls - - - - -	54
<i>Note by the Editor</i> - - - - -	55

SECTION IV.—SUPERIOR TECHNICAL INSTRUCTION :

	PAGE
General observations - - - - -	57
Towns in which superior technical schools might be founded -	61
General system—Day school - - - - -	63
School payment - - - - -	63
Management, discipline - - - - -	64
Examinations - - - - -	64
<i>Note by the Editor</i> - - - - -	65

SECTION V.—COMMERCIAL EDUCATION :

General observations - - - - -	65
On the commercial education of girls and women - - -	70
<i>Note by the Editor</i> - - - - -	71

SECTION VI.—SUPERIOR PUBLIC INSTRUCTION OF THE APPLIED SCIENCES :

General remarks - - - - -	71
On the means of procuring professors of technical instruction -	73
Founding establishments analogous to the Conservatory of Arts and Trades - - - - -	75
Libraries - - - - -	76
<i>Note by the Editor</i> - - - - -	77

SECTION VII.—TEACHING OF DRAWING :

Observations on teaching drawing - - - - -	77
Schools and Museums of Industrial Art - - - - -	81
<i>Note by the Editor</i> - - - - -	83

SECTION VIII.—INTERVENTION OF THE STATE :

On the intervention of the State - - - - -	84
Teaching of industrial drawing - - - - -	88
General conditions to which the opening of establishments for technical instruction should be subject - - - - -	89
Formalities to be observed - - - - -	90
In-door pupils - - - - -	91
Jurisdiction - - - - -	92
Rights granted to foreigners - - - - -	93
Superior council of technical instruction - - - - -	93
Inspectors - - - - -	94
Works intended for technical instruction - - - - -	95
<i>Note by the Editor</i> - - - - -	96

TECHNICAL INSTRUCTION—DRAUGHT OF BILL - - - - -	98
<i>Note by the Editor</i> - - - - -	102

NOTES.

NOTE I.—SOCIETIES OF PATRONAGE :

Christian Brothers - - - - -	103
Patronage of the Society of St. Vincent-de-Paul - - -	103
The Abbé Halluin's House of Rescue at Arras - - -	104
Apprentice-Society at Orleans - - - - -	105

	PAGE
NOTE I.— <i>continued.</i>	
Industrial Society of Nantes - - - - -	110
Superior Municipal Professional Society of Nantes - - -	111
Protestant Schools - - - - -	112
Jewish Societies - - - - -	112
Paris Society for the Succour of Jewish Apprentices and Workmen -	114

NOTE II.—SPECIAL WORKSHOPS FOR APPRENTICES :

Apprentice schools in Belgium - - - - -	115
Establishment of St. Nicolas - - - - -	117
Apprentice workshops of the Christian Brothers - - -	118
Agricultural Orphanage at Bouffarick - - - - -	119
Power-loom weaving-school at Mulhouse - - - - -	120
Spinning-school at Mulhouse - - - - -	123
Spinning and weaving school at Amiens - - - - -	124
Cozette Institution at Amiens - - - - -	125
Association for the Technical Instruction of Women - -	125
Asylum of St. Marie-aux-Mines - - - - -	126
Orphanages and Apprentice Schools of Calvados - - -	127
Agricultural Orphanages of Alsace - - - - -	128

NOTE III.—SCHOOLS ESTABLISHED IN WORKSHOPS :

Professional school of the Graffenstadt factory - - -	129
Schools at the steamship-building works of La Ciotat - -	133
Schools at the factories of Wesserling (Haut-Rhin) - -	133

NOTE IV.—ON THE PRESENT TENDENCY TO SUPPRESS APPRENTICESHIP IN LARGE TOWNS :

Remarks on this subject - - - - -	135
-----------------------------------	-----

NOTE V.—DIFFERENT SYSTEMS OF PROFESSIONAL INSTRUCTION FOR WORKMEN :

Birmingham Mechanics' Institute - - - - -	137
Glasgow Mechanics' Institute - - - - -	137
Popular library and schools founded by M. J. J. Bourcart of Gueb- willer (Haut-Rhin) - - - - -	138
Statutes of the popular schools at Guebwiller - - -	140
The institution, its object, means, and organization - -	140
Sections, professors - - - - -	141
Formation of a section ; admission - - - - -	141
Administration of the sections - - - - -	142
Commissioners - - - - -	142
Funds of the society - - - - -	143
Rights and duties of the members - - - - -	143
Penalties for breaches of discipline - - - - -	143
Management - - - - -	144
Director of instruction - - - - -	145
Patron - - - - -	145
Gifts and loans.—Founders and donors - - - - -	146

	PAGE
NOTE V.— <i>continued.</i>	
Modifications of the statutes - - - -	147
Regulations - - - -	147
Programme for the year 1863-64 - - -	148
General moral influence - - - -	148
Project of a Society for Popular Education at Mulhouse -	149
Statutes of the popular society of Mulhouse -	149
State of the Mulhouse Popular Courses in 1864-65 -	154

NOTE VI.—SPECIAL INSTRUCTION IN THE BUILDING ARTS:

General observations - - - -	156
Schools for builders in Germany - - -	157
Building school at Nienburg (Hanover) - -	157
Building school at Holzminden (Brunswick) -	158
Building schools in Saxony - - - -	158

NOTE VII.—CENTRAL SCHOOL AT LYONS:

Organization - - - -	159
Programmes - - - -	160

NOTE VIII.—COMMERCIAL SCHOOL FOUNDED IN 1864 BY THE PARIS CHAMBER OF COMMERCE:

General programme - - - -	162
---------------------------	-----

APPENDICES.

APPENDIX A.—Summary of the aid given by the Government to Technical Education in the United Kingdom - - -	163
APPENDIX B.—Table showing the number of students receiving in- struction, and examined in the various science subjects since the year 1864 - - - -	166
APPENDIX C.—Return of students entered at the Royal School of Mines since the commencement in 1851 - - -	167
APPENDIX D.—List of Science Schools and Classes throughout the United Kingdom in connexion with the Science and Art Department of the Committee of Council on Education, Christmas, 1867 -	168
APPENDIX E.—List of Schools of Art throughout the United Kingdom in connexion with the Science and Art Department of the Committee of Council on Education, Christmas, 1867 - - -	174
APPENDIX F.—Account of the Bristol Diocesan Trade School -	179
APPENDIX G.—Statistics of the engineering students and apprentices at H.M. Dockyards - - - -	184

TECHNICAL INSTRUCTION.

REPORT.

SECTION I.—GENERAL CONSIDERATIONS.

ON THE CO-OPERATION TO BE DEMANDED FROM THE MINISTRY OF PUBLIC EDUCATION.

THE technical education, best adapted to impart to our agricultural and industrial populations that special knowledge which will enable them either to become successful cultivators of the soil, or to contend with success in the pacific industrial struggle in which all the producers of the world are now competing, is so various that to give it a general organization presenting a uniform character is a very difficult matter. But all its branches, however different they may be, have one common and indispensable starting point,—primary education.

This first degree of instruction, the basis of all studies, literary, scientific, or industrial, is under the special charge of the Ministry of Public Instruction. But all the information collected during the last thirty years on the progress it has made in France, so very slow compared with the results obtained in most other countries of Europe; the complaints of the eminent manufacturers (examined during the inquiry), who called attention to the almost total absence of literary instruction among the cleverest and most intelligent workmen, as the obstacle which prevents employers from obtaining competent foremen and overseers; the examples, at once sad and yet honourable, of energy observed in some evening schools, where workmen, already well skilled in their art, but totally uneducated, have the courage, notwithstanding their thirty years and upwards, to come and learn to read and write; lastly the impossibility of imparting scientific instruction, even of the most elementary kind, to youths and workmen who have not acquired the knowledge which forms the basis of primary instruction—all these motives have induced the Commission to express, at the very outset of its labours, the wish that to the persevering efforts of the Ministry of Public Instruction, to the ever increasing sacrifices made by the State for the development of primary

education, may be added all other measures of a nature to accelerate the progress of these preliminary studies.

The legal action of the State and the constitution of an educational body composed of able men like the University, are the only means to which recourse can be had in order to overcome the prejudices and antipathies which oppose the diffusion of education among all ranks of the population; to surmount the contemptuous indifference of unlettered parents, which inclines them to deprive their children of all instruction, and the inertia and ill-will of certain municipal councils in the provinces. In the opinion of the Commission, the Ministry of Agriculture, Commerce, and Public Works, cannot, on this head, make too urgent an appeal for the aid of the Ministry of Public Instruction.

If this co-operation be indispensable for the work which the Commission has undertaken in favour of apprentices and ordinary workmen, it is no less necessary for the intellectual development of young men more favoured by fortune and better prepared, who, having made choice of an industrial career, are willing and able to undertake a more extensive course of literary and scientific study.

While acknowledging that the best preparation for studies of any kind is the literary instruction to be obtained in our Lycées and completed in the University, we are obliged to accept the conditions which the necessities of life impose on a great part of the rising generation. Nearly all parents whose children will have to work for a living are compelled to limit the cost and duration of their studies. Means must therefore be sought to reconcile these conditions with the call for a sound literary and scientific education, and the Ministry of Public Instruction has been engaged in considering this important and difficult question.

As far back as 1847 the most competent men, those most illustrious in letters and in science, combined their efforts to constitute a distinct course of instruction, intended to prepare young men for the careers of the public service, of industry, and of commerce. The organization of studies decreed in 1852 had no other object, and nearly the same may be said of that which is now in preparation under the name of *Special Education*.

The Commission has not had to consider any of these institutions which fall within the exclusive province of the Ministry of Public Instruction. But, in conjunction with two of the most illustrious ministers who have presided over the direction of the University, it is convinced that good progress may be made in literary studies without devoting any great attention to Greek and Latin; that the learning of

living languages, and the reading of their master-pieces, are also capable of giving the mind that development, that breadth and loftiness of views which are acquired by the study of the dead languages, and the Commission eagerly desires to see realized the organization of studies above designated under the term *Special Education*. Under whatever forms they may be created, provided they supply our industries with young men versed in the study of French literature and of living languages, and properly prepared for that of the sciences, these establishments will become a nursery capable of producing distinguished pupils, for whose use it would be proposed to found superior technical courses of instruction, intended to enable our national manufactures to compete successfully with those of the foreigner.

To generalize primary education by all possible means, and to constitute a course of literary and scientific instruction, apart from the study of the dead languages, are therefore the means of co-operation which the Ministry of Agriculture, Commerce, and Public Works ought, in the opinion of the Commission, to expect and demand from that of Public Instruction.

DEVELOPMENTS AND COMPLETION OF PRIMARY EDUCATION.

It is not the province of the Commission to consider the modifications of which primary education is capable, and which belong essentially to the department of the Ministry of Public Instruction; it will therefore be content with expressing the wish that measures be taken to prevent or diminish, as far as possible, the practice of leaving school during summer, and to extend the period of study beyond the age of the first communion.

One of the pretexts which the inhabitants of the rural districts most generally put forward as an excuse for not sending their children to school in summer is, that their aid is required in field labour. Now, as the very slight assistance of children, from seven to 12, or 13 years of age at most, cannot be continued for 10 or 12 hours without exceeding their strength, the result is, as shown by the evidence of many schoolmasters, that in the leisure thus left them, they are apt to contract habits of idleness, disorder, and vagrancy, sometimes to a deplorable extent.

Should it be found impossible to suppress this usage altogether, something might surely be done to considerably lessen its inconveniences, by reducing school hours in summer to one attendance,—say from six till nine in the morning,—leaving the rest of the day free for work in the

fields; the studies would thus continue throughout the whole year. On the other hand, the schoolmasters being thus relieved of half their duties might be required on Sunday mornings,—from six till nine, for instance,—before divine service, to hold a class for lads from 13 to 16 or 17 years of age, the object of which would be to improve them in what they had already learned, or to extend their stock of knowledge to useful information, in drawing, agriculture, arithmetic, national history, &c., &c. These classes for improvement, by preventing boys from forgetting what they had learned in the primary school, would accustom them to preserve a taste for reading and study, and would prepare them to follow, with some little benefit, the evening schools that might be organized in all cities, towns, and even in a great number of the rural communes during the winter season.

If the Ministry of Public Instruction can give to primary education this beneficial reform, which seems indispensable in every point of view, it will have facilitated the organization of the instruction of the working classes which the department of Agriculture, Commerce, and Public Works intends to diffuse and promote both in towns and rural districts.

In expressing these wishes, the Commission has no other object than to give prominence to the great utility of, and necessity for, the common and general instruction which the University, thanks to its powerful organization, is so able to give and disseminate, and the diffusion of which, in every degree, is indispensable for the development of the technical education which we were especially called to study. For the realization of them it confidently relies on the patriotic co-operation which cannot fail to be established between the Ministries of Public Instruction, and of Agriculture, Commerce, and Public Works, and without which the isolated efforts of the two departments would produce only incomplete results, and perhaps even prove altogether useless.

Note by the Editor.

If all the Government establishments for technical training, and the grants made to schools of science and art, were placed under the management of the Board of Trade in co-operation with the Committee of the Privy Council on Education, we should have in this country a similar organization to the one here recommended by the French Commission. That this plan suggested itself also to the English Government is shown by the fact, that when originally founded, the Department of Practical Art was made a branch of the Board of Trade. Practically it was found that all our educational institutions would be better administered by placing them under the control of one head, and accordingly, in the year 1853, the Department of Practical Art was handed

over to the Committee of the Privy Council on Education, under the name of the Science and Art Department. A summary of the aid extended by this department to schools and classes for technical education is given in Appendix A., page 163, of this volume.

Deficiency of primary instruction presents in this country the same obstacle to the diffusion of technical education among the working classes as it does in France; and although the extension of the Factory Act, and the passing of the Workshops Act, will ultimately overcome this obstacle, except in the rural districts, some time at least must elapse before the results are very manifest.

It is among the middle classes that, perhaps, the want of a special training is at this moment more particularly felt; but the institutions for middle-class education have not been made subject (with some few exceptions) to direct parliamentary control, nor do the large endowments they possess appear as yet to be available for instruction of a special character.

SECTION II.—ON APPRENTICESHIP.

CONSIDERATIONS ON THE PROFESSIONAL AND TECHNICAL INSTRUCTION OF APPRENTICES.

Supposing primary education to have been acquired and sufficiently completed in the evening and Sunday schools, the Commission has successively considered the various categories of workmen engaged in different capacities in the industrial trades. It is generally acknowledged that the condition of superior education is, for the most part at least, sufficiently good to supply the national industry and public works with managers and engineers who can successfully compete with the foreigner; but it is no less indisputable that a general absence of technical instruction is manifested in the lower ranks of the industrial army. The Commission therefore has deemed it advisable to commence its enquiry by ascertaining the measures to be taken for giving young men, who enter on these careers, the elements of the education wanted; for this reason, it has decided on first devoting its attention to apprentices and the conditions of apprenticeship.

From a purely professional point of view, and considering only the necessity for young artisans to acquire manual dexterity and the habit of rapid production, the information and experience obtained during the inquiry leave no doubt as to the advantages presented by apprenticeship in the workshop itself, under the eyes of a judicious master and by simple contact with the most practised workmen. It must not, however, be supposed that apprentices taught in workshops generally become after four or even six years

workmen capable of gaining remunerative wages; too often employed as mere labourers, they are sometimes only practised in the execution of certain parts and not in the whole of their trade; the masters or foremen under whom they are placed seldom take the trouble to explain to them the rules and principles which must guide them to the best possible execution. The advantage of apprenticeship in a workshop is, therefore, in great measure reduced to the habit, early contracted, of producing with proper dispatch, and of learning, by observation, the processes adopted by the masters. Moreover, we must not forget that one of the principal conditions of rapid production is the division of labour, on account of which the apprentice learns to do only one thing, which he is constantly repeating, so that he does not really learn his trade.

But, unfortunately, by the side of the very real advantages of apprenticeship in the workshop, when the proper conditions are fulfilled, experience makes known the existence of numerous vices, particularly in large towns, owing to its present organization. For this reason the Commission has especially directed its attention to measures for remedying the present state of things, as well as to the means which, according to circumstances, may be employed to secure to young apprentices the necessary education, as well as the practical knowledge of the trade which they have chosen to follow.

ORDINARY APPRENTICESHIP.

The inconveniences of the mode generally followed for imparting technical knowledge to young workmen by means of apprenticeship, and for teaching them the practice of the trade they are to exercise, are too well known, and perhaps have been too much exaggerated for it to be necessary to dwell on them here. But, all exaggeration apart, it must be acknowledged that in large cities, especially in Paris, these inconveniences are anything but imaginary. Too often the lad of 12 or 15 who becomes an apprentice is long regarded by his master as merely an unpaid servant; he is not only employed in jobs about the house but is also sent out as a messenger or porter, and has frequently to carry burdens beyond his strength. To the physical sufferings the young apprentice has to endure are sometimes added moral ones also.

On the other hand, if reproaches are merited by masters who undertake to instruct apprentices, the disputes submitted to the councils of prud'hommes (*conseils de prud'hommes*)

prove also that many of the complaints put forward by the parents for the purpose of obtaining the cancelling of the indenture when such indenture exists, are without foundation. This is so general, that in most of the cases brought before the councils of prud'hommes, the decision is habitually in favour of the masters, notwithstanding the interest exerted by the apprentices.

One of the most respected members of these councils being interrogated on the subject, affirmed that very often as soon as parents, after a couple of years of apprenticeship, think their son capable of earning wages, they try to break off their contract on pretexts, more or less well founded, which may be summed up as follows:—

Ill-treatment	-	-	Never true.
Bad food	-	-	Seldom true.
Over work	-	-	Often true.
Sunday work	-	-	Nearly always true.

In such cases the councils of prud'hommes most frequently decide in favour of masters; the apprentice, compelled to continue his work, resists by inertness and idleness, and the master finds himself obliged to tear up the indentures. Further, the prud'hommes are themselves in general not sufficiently enlightened as to their duties and their legal rights, and they frequently hesitate to inflict the penalties which the law authorizes.

When, on the contrary, there is no written contract, the abuses are still more serious and more difficult to repress. It, moreover, often happens that to the abuses already mentioned is added that of exacting night-work.

Doubtless exceptions to the abuses pointed out are numerous and honourable, and among masters there are many whose consciousness of their duties towards the young is sufficient to lead them to carry out the engagements they have contracted. But these exceptions nowise disprove the inconveniences and the deficiencies of the existing organization. The Commission, therefore, immediately on resuming its labours, and after the printing of the results of the Inquiry, and of the reports on the missions intrusted to some of its members, either at home or abroad, did not hesitate to put forth the following unanimous opinion:—

“The demands of technical instruction, so far as apprentices are concerned, are not sufficiently satisfied.” (18th sitting.)

Convinced of this truth the Commission deemed that one of its first duties should be to inquire into the means of giving a regular form to the relations existing between master

and apprentice; so as to secure to the latter a moral support and obtain for him the facility of completing the little, and very often superficial, instruction which he was able to acquire at the primary school; to strengthen in his heart the religious and moral sentiments which his early education had sought to implant. The Commission considered it of importance to study the most efficacious means of regulating or watching over the condition of the apprentice.

But to succeed in this, the Commission, before occupying itself with the modifications there might be ground for introducing into the legislation that at present governs the contract of apprenticeship, felt bound to obtain further light by the examination of the various attempts that have been made either to remedy the inconveniences pointed out, or to organize apprenticeship on other bases. In the first place, the Commission sought to obtain a clear idea of the action of societies, whose self-imposed mission it is to watch over young apprentices.

SOCIETIES OF PATRONAGE.

Charity, that sentiment of devotedness and love to our fellow-creatures whose divine precepts are supplied to us in the Gospel,—but which, it is right to acknowledge, is not a virtue exclusively reserved to Christian denominations—charity has found out for the difficult problem that occupies the Commission, solutions which differ in form, but which may all be summed up in the title *Societies for the Patronage of Young Apprentices*.

Their action, notwithstanding variety of modes, consists generally in placing the children with masters selected as offering the necessary guarantees of morality and kindliness; in private, and sometimes even recognized intervention in the drawing up of indentures; in watching over the execution of the contract, and in helping to smooth away the difficulties which may arise; in inserting and seeing to the observance of clauses which reserve to the lads a certain number of hours to devote to the completion of their instruction; in encouraging study, assiduity, and good conduct by rewards, by prizes, and even by small wages; and, lastly, by finding places for young apprentices out of their time. This paternal action is often continued still longer by means of evening lessons, and of lectures, in which the work of instruction and moral teaching is continued.

These philanthropic associations are as considerable in their number as they are varied in their particular forms; whether Catholic, Protestant, or Jewish, lay or ecclesiastic

they all pursue with devotedness and with various success the work which they have undertaken.

In this report it would be impossible to describe in detail the constitution of all the societies known, but it has been thought useful to add notes giving such particulars for a few of them, in order that their organization may serve, according to locality and circumstances, as types for new foundations. A simple list of the names of these societies is here presented; the details will be found in the special note given for each. (Note I., p. 103.)

The societies of patronage with respect to which detailed information has been received are the following:—

The Mission of Apprentices (*Œuvre des Apprentis*), founded in Paris in 1842 by the Count de Melun, which has spread into the departments under the direction of the Christian Brothers.

The Society of Saint Vincent-de-Paul.

The Abbé Halluin's House of Rescue, at Arras.

The Societies of Orleans.

Of Nantes.

Of the Protestants of Paris.

The Jewish Societies for the Encouragement of Labour in Alsace and at Paris.

It is only right to say here that the charitable intervention of these societies is purely benevolent and voluntary, that it has no legal character, and that in the disputes carried before the councils of prud'hommes it is nearly always, and especially at Paris, admitted only in the form of written information, but not of depositions before the court. This intervention has, however, the greater influence upon decisions, as it is evidently disinterested.

Such societies, which are nearly always due to private initiative, cannot be too highly encouraged. Though absolute independence of action is requisite in order to leave them all the merit of their zeal, there is no doubt that encouragements properly given, placing at their disposal municipal premises, making grants of books and models, and even pecuniary aid, may effectually contribute to their development, which is so highly desirable for the moral training of the young.

SPECIAL APPRENTICE-WORKSHOPS.

The opinions expressed during the inquiry,—those of persons who have given their attention to the apprenticeship of young workmen after leaving the primary school, are divided as to whether really useful and important results can

be obtained by putting them into special workshops under the guidance of masters and foremen during the usual time of apprenticeship, and by giving a few hours each day to studies calculated to complete their primary instruction. This plan, which would combine the practical teaching of the trade with a beneficial instruction, and would at the same time maintain the moral tone of the workshop, has seemed to some benevolent minds, notwithstanding the advantages it offers, more plausible than effective. The example of certain industrial schools where similar workshops were established, in which the pupils worked a few hours, has not appeared encouraging. In general, the reproach brought against every school-workshop is that it does not realize the necessary industrial advantages, and especially that it does not accustom the pupils to that rapidity of execution which is one of the principal conditions of economical production. These objections are serious ones, and most of the examples on which they are founded do but too well justify them.

But, from the fact of this system of apprenticeship having been imperfectly applied in a certain number of cases, does it follow that, with a good organization meeting as far as possible the normal requirements of industry, we could not succeed in forming by this method able workmen, having sufficient instruction, and above all, prepared to enter society with moral sentiments, which would make of them useful and respectable citizens. The majority of the Commission have not thought so, and, if the negative results on which is based the contrary opinion are incontestable, the positive results which may be opposed to them, by showing the right road to be followed to secure success, appear sufficiently conclusive to permit us to consider special apprentice-workshops as one of the means which, according to the local and peculiar conditions of industry, may be employed in forming clever and properly instructed workmen.

This form of apprenticeship is too interesting, and has received too many various applications for it to seem unnecessary to mention some of the establishments founded with this object. The variety of those with respect to which it has been possible to gather precise information, shows that this mode of apprenticeship may be applied with success to every description of workmen and trades, and also that it may take as its point of departure any degree of instruction.

It is important likewise to remark that, from the very fact that the production of manufacturers is not, in the

present case, and ought not to be, the chief object of such establishments, the principle of the division of labour is not introduced into them. On the contrary, care is taken to get the pupils to execute in succession various objects graduated according to their progress, so as to teach them every branch of the trade they intend to follow. A real apprenticeship is thus given to them more effectually.

Without introducing into this report details relating to each of the examples which have been studied, and which will be found in Note II., a simple list is here given of their names and objects :—

- Belgian apprenticeship-schools for weaving ;
- | | | |
|---|---|---|
| Apprentice-workshops directed by the Christian Brothers | { | at Saint Nicolas, 12 different work- |
| | | shops ; |
| | | at Saint Omer ; |
| | | at Igny, for gardeners ; |
| | | at Issy, for gardeners ; |
| | | at Clermont-Ferrand, for gardeners ; |
| | | at Volvic, for stone-cutting and sculp- |
| | | ture ; |
| | | at Beauvais, for design applied to car- |
| | | pets and stained-glass ; |
- Agricultural Orphanage at Bouffarick, Algeria ;
- Weaving-school at Mulhouse ;
- Spinning-school at Mulhouse ;
- Spinning and weaving school of the Industrial Society of Amiens ;
- Maison Cozette at Amiens ;
- Asylum of Sainte Marie-aux-Mines (Haut-Rhin) ;
- Orphan Establishments and Apprenticeship-schools of the Department of Calvados ;
- Agricultural Orphan Establishments of Alsace.

In all these various establishments experience proves that, on leaving, the pupils have acquired sufficient ability in the trade they are intended for to enable them to obtain wages at least as high as those earned by ordinary apprentices, and that they have received or improved their general and technical instruction up to the limits required by their social position. With this instruction are generally combined habits of order and morality, which cause them to be sought for by the heads of workshops.

As for the pupils of the technical schools of weaving and spinning, they obtain advantageous positions in the special lines they adopt.

The example offered by Belgium, Würtemberg, and the Duchy of Baden, where poverty and beggary have disap-

peared through similar foundations, proves their utility both to individuals and to society in general.

In this list are to be found institutions differing very much from each other and giving practical instruction of very different kinds. Some, like the Belgian weaving schools, the agricultural and other orphan establishments, combining primary instruction with apprenticeship, are limited to the formation of apprentices of the humblest order; others, like the workshops of the Christian Brothers, take the boy when he leaves the primary school and improve his instruction at the same time that they teach him a trade; lastly, the weaving and spinning schools of Mulhouse and those of Amiens, without attending to general instruction, have merely for object to teach their pupils the principles and theory and at the same time the practice of those industries, so as to train them to be foremen in workshops and manufactories.

From the whole of these observations it seems we may conclude that the establishment of special apprentice-workshops, suitably organized and suited to the demands of local industry, is capable of rendering good service, and is deserving of the sympathy and encouragement of the State. But it must at the same time be acknowledged that institutions of this kind, which are nearly always due to private charity or inspired by local and peculiar circumstances, are necessarily very limited in number, and will never be able to supply more than a scarcely appreciable proportion of the working men of whose services industry stands in need. In a word, it is really in the workshop alone, such as it generally exists, that the mass of apprentices will always be trained, and it is therefore to the practice of the workshop that we must seek to join the technical instruction which the young workman requires.

SCHOOLS FOR APPRENTICES ESTABLISHED IN WORKSHOPS AT LÉPINE AND GRAFFENSTADT.

Though in the countless mass of trades and petty industries existing in the great centres of population, the general mode of apprenticeship possesses certain advantages, together with serious inconveniences, and leaves much to be desired as regards the interest of the apprentices, it is not the same thing in establishments which employ numerous staffs of workmen requiring to be kept up by an uninterrupted succession of trained apprentices. In these it becomes more easy to reconcile the requirements of work with those of

instruction. Wherever the principals, acting from a feeling of enlightened philanthropy, appreciating the advantage of the instruction imparted to their workmen, and even having regard to the prosperity of their manufacture,—wherever they have consented to create schools for their apprentices and workpeople, results have been obtained which are satisfactory as regards both the industrial progress and the moral improvement of the labouring classes. The regularity and discipline that are indispensable in large establishments likewise permit the principals to introduce rules which would perhaps be inadmissible in other cases, and to oblige at least the apprentices to attend the classes, where they are to acquire or to complete their primary instruction. The school is established in the manufactory, in the very workshop, under the general direction of the head of the establishment, who, while spreading instruction, enjoys the satisfaction of having honourably fulfilled a moral duty and reaps the advantage of forming for his manufactory an enlightened, intelligent, and attached set of workpeople from whom he can always recruit, in a regular and uninterrupted manner, the staff that he needs.

It is thus that the matter has long been understood by the principals of the chief industrial establishments of Alsace, in the creation of the various institutions they have founded for the instruction of their workpeople, which will be spoken of hereafter. For the present we shall confine ourselves to mentioning a few examples more specially connected with the instruction of apprentices.

School at Lépine.

This school, which is the oldest known, dates from a period already distant. As early as the year 4 of the Republic there figured at the first Exhibition of Industry in the Champs de Mars the products of a water-power cotton-spinning mill established at Lépine, near Arpajon, by Mons. de Laitre, who was afterwards prefect of the Department of Eure-et-Loire. The report of the exhibition of the year 9 states that in this spinning-mill, which already produced cotton yarn No. 160, *a hundred young girls from the Paris poor-houses were being brought up and trained to work.*

School at Graffenstadt.

We might mention the organization of a great number of schools established in the large manufactories of Alsace, and at Creuzot, La Ciotat, Creil, &c., but it is thought better to describe with some detail the organization of the profes-

sional school at Graffenstadt (Bas-Rhin), because its regulations may serve as a type for similar institutions. These regulations will be found in Note III., p. 129.

EXAMINATION OF THE LAW OF APPRENTICESHIP.

After carefully examining the various conditions to which the young workman is submitted in passing through his apprenticeship to the trade for which he is intended, the Commission was naturally led to examine whether the law of 1851 relating to contracts of apprenticeship offered the necessary facilities and guarantees for the instruction of the young. The question most directly connected with the object which the Commission had in view was, in fact, the extension that it might be right to give to Article 10 of that law, which is thus worded:—

“ART. 10. If the apprentice, being under 16 years of age, cannot read, write, and cipher, or if he has not finished his first religious education, the master is bound to let him take, out of the working day, the time and liberty necessary for his instruction. This time, however, shall not exceed two hours per day.”

This article, as is evident, relates merely to primary and to religious instruction, and, according to its letter, the apprentice who shall have passed through these first two stages of instruction will not be entitled to the two hours reserved.

Convinced that the primary instruction acquired by children before the age of the first communion, before 12 or 14, is generally too incomplete and always insufficient for the requirements of industry, the Commission declared unanimously (18th sitting):—

“That it would be useful that schools and classes for continuing primary instruction should be opened in the evenings and on Sundays, in order to give to young apprentices those first elements of technical instruction which they need for the exercise of their profession.”

Hence the necessity for a new wording of Article 10 mentioned above, so that there may remain no uncertainty as to its extension to the teaching specially intended for apprentices.

Several members, however, doubted whether the two hours per day reserved by the law were sufficient for the apprentice to improve his primary education, and to acquire the technical knowledge available in his trade. It was remarked also that, in large towns especially, two hours of

liberty did not correspond to two hours of work, and that consequently, on taking into account the inevitable loss of time, there could not be at the utmost more than an hour and a half, or even one hour, of real study. On the other hand, the examples of the Graffenstadt school and of those at Vienna, Stuttgart, and in the Grand Duchy of Baden, where the apprentices do not even devote two hours every day to their technical studies; and the information supplied by the minister himself on the results obtained in the workshops of La Ciotat, where drawing lessons of two hours every evening suffice, in a few years, to transform smiths and boiler-makers into draughtsmen sufficiently skilful and intelligent to be admitted to the staff of officers of the establishment, and of its maritime services, have decided the Commission to admit (18th sitting):—

“That two hours a day devoted to professional technical studies, in which drawing should form the principal element, are sufficient.”

After admitting in principle the extension to be given to Article 10 of the law of 1851, the Commission also inquired whether, as a compensation for the obligation that would be imposed on him of allowing his apprentices two hours a day for the improvement of their education, the master ought not to be empowered to require the proof of attendance at a school, class, or course of lessons during that time, and at the same time be called on to see to this attendance in the interest of the parents of whom he is the representative.

On this point several members remarked that the master, on whom the contract imposed the sacrifice of the two hours a day which the apprentice would otherwise devote to work, has reciprocally, to a certain degree, the right to require that the latter shall really and usefully employ the time thus taken away. He would, in fact, after the first years, find compensation for his loss in the development of the apprentice's intelligence and in the power he would acquire of executing and of understanding a drawing. The control exercised by the employer would besides offer but slight difficulty when once the school or course of lessons to be attended by the apprentice were known, as a daily ticket from the teachers would suffice.

In answer to these observations it was said that the lad, even if living with his master, as is frequently the case in large towns, would fall back again during the two hours, at least by implication, under the control of his family, and that, although the master ought always to be considered as re-

placing the parents in preventing the boy from playing truant, there was no ground for arming him with the power of requiring regular attendance at the course of lessons or class during the two hours liberty left to the apprentice for that purpose.

After this discussion the Commission came to the conclusion :—

“ That though it may be right to invest the employer
“ with the necessary authority for insuring regular attend-
“ ance at school, it is well to leave the arrangement of the
“ question to an agreement freely made between him and
“ the parents, who are of all parties the most interested
“ in the instruction of the boys.”

Length of Working Day for Apprentices.

As regards the length of the apprentices' working day, it appeared to some members that, if the reduction from 12 to 10 hours' work per day—demanded and already obtained by a considerable number of the various classes of workmen at Paris—should become general, it would be implied that the two hours granted to apprentices for their instruction ought to be taken out of their work-time, and their stay in the workshop be limited to eight hours.

But, it was observed, the diminution of the hours of labour is not yet admitted at Paris even, except in certain trades, and is often more imaginary than real, seeing that the very workmen who have demanded and obtained it, frequently come and ask for over-hours, to be paid separately* ; further, that the agreements come to on this subject are pure matter of contract, peculiar to certain localities and trades, and having generally no legal character, so that it would not be advisable to adopt them as the basis of any regulations.

On the other hand it would not perhaps be prudent to make apprenticeship more burdensome to employers, for fear of rendering general the tendency already existing in many shops, as will be seen further on, to receive lads no longer as apprentices but as workmen. Besides, supposing even the restriction of labour to 10 hours a day should become general, the apprentices would still have in the

* The working coachmakers demanded that for these over-hours they should be paid double price; but, when the masters on acceding to the demand imposed the natural condition that every workman should regularly give 60 hours of ordinary work per week before counting overtime, the workmen demurred to this clause which interfered with their habits of holiday-taking.

evening two hours at least, the most useful and profitable employment of which, in every point of view, would be the improvement of their education.

These motives determined the Commission not to recommend any restriction of the hours of work for apprentices beyond that already specified in the law of 1851. In the opinion of the Commission :—

“ The modifications to be introduced into the law of apprenticeship, with a view of securing and facilitating the development of the technical instruction of apprentices, are reduced to extending to this class of instruction the condition imposed upon the master of allowing two hours per day for attendance at lessons and classes organized for the purpose. The Commission cannot, without overstepping its province, treat in this report of questions which are foreign to it; but it is perhaps not out of place to indicate in a note the tendencies of an already considerable portion of the Parisian workmen to seriously modify, and even altogether suppress, apprenticeship in certain trades, a result which might have serious consequences.” (Note IV., p. 135.)

EXAMINATION OF THE LAW OF 1841.—THE LABOUR OF CHILDREN AND WORKING LADS IN SMALL WORKSHOPS AND IN MANUFACTORIES.

Necessity of regulating the Labour of Children and Young Lads in small Workshops.

The tendency already pointed out as manifesting itself in large towns, to escape from the obligations of the apprenticeship contract by its suppression, and also the employment of numerous children in small workshops, appeared to the Commission to merit serious attention. The question arose whether it would not be desirable to apply to the labour of these children the same rules as are in force with regard to the labour of children employed in manufactories. The non-observance of the present law and its inadequacy are besides so well proved that it seemed necessary to give further extension to the subject. It was resolved, first, to examine in all its parts the law of 1841, on the labour of children in manufactories, in order to determine the modifications of which it might appear susceptible, and the measures to be employed for rendering its action more effectual and the observance of it more real.

The discussion began as to the age at which the admission of children into workshops and manufactories should be permitted. The lower limit of eight years fixed by Article 2 of the law did not appear high enough. At that age, which is one of growth, the child is not sufficiently developed, and has not acquired the needful strength to resist the fatigue induced by work, though to all appearances the work may be light; besides he has need of liberty and the open air, and it is already a great restraint to keep him for some hours in school that he may acquire primary instruction, which scarcely begins at the age of seven or eight. If to this be added the labour of the workshop, there will be some danger of injuring his physical development and consequently that of the whole of the population. The application of the Recruitment Law proves that in a somewhat large number of Departments, and principally in manufacturing towns, it is difficult and sometimes impossible to obtain the contingent of young men of 20 years of age required for the army. In spite of the prescriptions of Article 5 relating to attendance at school, which attendance is almost a fiction through the non-observance of the law, the boys admitted into manufactories, and especially those employed in small workshops, are too often deprived of all instruction, so that their mental development is as much neglected as their physical constitution is deteriorated.

These considerations led the Commission to declare, without a dissentient voice, that the limit of eight years is too low. It was proposed by several members to raise it to 12, as determined in Prussia by the Royal Ordinance of the 16th of May 1853.* At that age, in fact, primary schooling may be about finished, religious instruction has been imparted, the child has developed, and is, in general, strong enough to yield a certain quota of work without injury.

On the other hand, however, it was objected, that in many trades it is almost indispensable to employ children rather younger; that the parents too have need of the child's little earnings; and that if the limit of the working day is fixed lower than that authorized by the law of 1841, the requirements of instruction and those of physical development could be satisfied by fixing at 10 the age of admission into workshops and manufactories.

These various reasons, and the desire of not introducing

* Report on the organization of professional instruction in Germany.

too abrupt a change into the existing state of things, led the Commission to adopt the following resolution :—

“ It is desirable that the limit of age for the admission of children into workshops and manufactories should be raised only to ten years.” (21st sitting).

The next question which presented itself to the Commission, and which, from the same points of view, is not less important than the preceding, was that of the length of the working day for children of from 10 to 13 years old. For several years this question has been raised at the repeated instigation of the Industrial Society of Mulhouse, which on various occasions * has asked that the working-day for children in manufactories should be reduced to six hours: and that, the number of those employed should be doubled, in order that the same amount of work might still be done. The other half of the day might thus be devoted partly to school and partly to rest and physical exercise, which is so necessary to childhood. An engineer of standing, who gave evidence before the Commission, likewise announced that in a large establishment for the construction of machinery, the company to which he belongs purposed doubling the number of apprentices employed, so as to be able to reduce their work to six hours. This is the limit fixed in Prussia by the Royal Ordinance before mentioned. The same regulation is adopted in some of the manufactories in the north of England, where work is successfully combined with attendance at school.

The possibility of thus rendering the labour of children in manufactories compatible with the instruction they need is proved in that part of England by the establishment of half-time schools, in which children of from 8 to 13 years of age must not, according to law, be occupied more than six hours a day. In England, as well as in Belgium, it has been remarked that children who for half the day are subject to the discipline of the workshop, pay great attention to their lessons at school, and acquire the instruction there given about as rapidly as those who go to school the whole day.

The whole of the foregoing considerations determined the Commission to recommend :—

“ That the labour of children of from 10 to 13 years of age, both in workshops and manufactories, should for the future be limited to six hours per day, and that a

* Reports of the Industrial Society of Mulhouse.

“portion of the other half of the day should be given to attendance at school.” (21st sitting.)

It will be remarked that such a regulation might very easily, with the help of the employer, be combined with a rule which should oblige the children to attend the school connected with the establishment, as indeed is already done in a large number of manufactories, in which the working population thus obtain the instruction they need, and the employed can rely on an intelligent set of workmen. The Commission is of opinion:—

“That for lads of from 13 to 16 years of age, the working day ought to be limited to 10 hours in all workshops as well as in manufactories (21st sitting). This would leave to those employed either as workmen or as apprentices at least two hours every evening, which they could devote to their instruction by attendance at lessons and classes.”

“That even in manufactories it is desirable that the obligation of attending a school, imposed by Article 5 of the law, should be extended to lads of from 13 to 16 years of age, so that by means of lectures and classes they might be able to complete their primary schooling, and acquire a certain degree of technical instruction, as is done with success at Graffenstadt, La Ciotat, Wesserling, Creuzot, and in many other establishments.”

Necessity for a System of Inspection.

The preceding discussions, and all the facts brought out during the Inquiry, proved the necessity of controlling the application of the law of 1841 more effectually than has hitherto been done. The regulations laid down in Article 8 were intended:—

1. To provide the necessary measures for the execution of the law;

2. To secure the maintenance of moral conduct and public decency in workshops, factories, and mills;

3. To secure the primary and religious instruction of the children;

4. To protect the children from all ill-treatment and improper punishment;

5. To insure the observance of the sanitary laws which are necessary to life and health.

All those measures, however, for the taking of which the promoters had relied on the action of Government, were omitted; no regular inspection was established, and the law fell into disuse.

Any other law, even if better and more efficient, would have the same fate and would be equally ineffectual, if it did not contain provisions for securing its complete and regular execution.

The first and most important measure to be taken, not only for such execution but also for the organization and development of technical instruction, which is the chief aim that the Commission has to keep in view, appears to be the creation of a regular system of inspection. By such a system the minister should be kept informed respecting the wants, the views, the more or less successful attempts, the results,—in a word, respecting all questions in any way connected with the general plan of technical instruction. It might also extend its investigations to a multitude of other questions relating to agriculture, to commerce, and to industry.

In accordance with these considerations, the Commission recommend—

“ That a system of inspection for insuring the execution
“ of all measures taken or to be taken for the organization
“ of technical instruction should be created in connection
“ with the Ministry of Trade.” (22nd sitting.)

The general basis of the questions connected with the apprenticeship, the labour, and the instruction of children in workshops and manufactories having been laid down by the foregoing resolutions of the Commission, it would be natural to inquire into the nature and mode of instruction to be adopted for that portion of the rising generation from which industrial workshops are to be recruited. But, as the solution to be given to these questions must be very nearly the same as for those relating to workmen already engaged in the workshops, it is thought better to reserve what was resolved on this subject to a subsequent part of the Report.

SCHOOLS OF ARTS AND TRADES.

The examination of the questions connected with the technical studies of youths intended for industrial positions of a secondary rank cannot be brought to a close without speaking of the Schools of Arts and Trades, as they exist in France, which have rendered to our industry services that were acknowledged, during the inquiry, in the handsomest manner by the most eminent manufacturers, and by the Minister himself.

The first idea of founding schools in which poor youths, in addition to primary instruction, should acquire the technical knowledge necessary for the practice of certain

trades, appears to be attributable to the Duke de la Rochefoucault-Liancourt, who in 1788, being then colonel of a dragoon regiment, established at his own cost on a farm called the *Ferme de la Montagne*, attached to his domain of Liancourt, a school in which the children of the non-commissioned officers of his regiment were brought up and taught a trade. When, in 1793, the Duke de la Rochefoucault was obliged to quit his country, the school he had founded received a large number of youths from various establishments, which were successively suppressed, and became a sort of military school. In 1799, the Duke returned to France, and was again put in possession of his domain of Liancourt, which the existence of the school had by a just requital of fortune preserved from sale as national property. One of his first thoughts was to insure the maintenance and development of the institution he had founded, and for which the *Ferme de la Montagne* had become inadequate. At his request the school was transferred to Compiègne under the name of *Prytanée Français*, which it bore in common with three other establishments situated at Paris, Saint-Cyr, and Saint Germain.* The division of this Prytanée established at Compiègne had particular regulations and included pupils intended for the mechanical arts, who, besides the general studies, had to go through an apprenticeship of three years.

In the year XI. of the Republic, after making a journey through the manufacturing towns of the North, the First Consul visited the school at Compiègne, and saw that the instruction was far below the requirements of industry. "I have everywhere found," he said, "foremen who are distinguished in their art, and very clever in execution, but scarcely one able to make the outline or the most simple calculation of a machine, to explain his ideas in a sketch or a memorandum. This is a defect in industry; I will find a remedy. Here foremen shall be trained for our manufactories." Napoleon did not delay the realization of his thought, and so early as the 6th of Ventose in the year XI. (25 February 1803) a decree of the Consul gave a new organization to the school at Compiègne, in conformity with the ideas he had expressed.

This, in fact, is the real object of the Schools of Arts and Trades, and the numerous skilful men whom they have

* General regulations of the French Prytanées, given by the Minister of the Interior and approved by the First Consul, the 27th of Messidor in the year IX. of the Republic.

given to industry have occupied with success the position which Napoleon intended for them. It is therefore quite an error to regard these schools, as they have long been regarded, as intended for the training not only of overseers and foremen but also of artisans, and, on this account, to reproach their pupils with not possessing the manual skill, and especially the rapidity of production, that are expected from a good workman. The things that these young men should be taught, as far as regards manual labour, are the principal rules of each art, the tracing, proportioning, verifying, fitting and putting together of the different members or parts of the machine. With the help of these principles, those pupils who, on leaving the Schools of Arts and Trades, improve their manual dexterity (and those who do so are the most likely to succeed in their future career), quickly become skilful artisans, working with all desirable rapidity. But it must be repeated, and experience proves, that this is not the proper object of the pupils; these are not the services they can and do render to industry. After a short stay in the fitting or the modelling shop, they pass on to those devoted to mounting and to drawing. Here, under the guidance of engineers, they make drawings and working plans, calculate proportions and study forms, and become capable of directing works, building-yards, and factories, and often of devising all kinds of machinery.

It is thus we form most of our able master-shipwrights who at present compete successfully with foreigners. Here we get the superintendents of works, and chiefs of workshops without whom neither our railways, our metallurgic establishments, nor our factories, could have been developed independently of foreigners. Now it is to France rather than to England that foreigners go to seek engineers and shipwrights.

All that has just been said is but the reproduction of the evidence given by M. Houel of the firm of Cail and Co. by M. Gouin, civil engineer, by M. Schneider, owner of the works at Creuzot, and by the Minister himself, who, in recalling his own recollections, dwelt with pleasure on the many and varied services which pupils from the Schools of Arts and Trades have rendered to the powerful company of the *Messageries Impériales*.

Far, therefore, from believing that the Schools of Arts and Trades no longer answer the present requirements of industry, it is desirable that means should be sought for raising the standard of their studies, and especially the average competency of the pupils, so that those who leave

the schools may always be equal to the work required from them. After mentioning the services rendered to industry in general, and in particular to the construction of machines, and after the testimony given by so many competent persons, it is right to add to the honour of these schools, that amidst all the political vicissitudes which have agitated France, their pupils have retained a grateful memory of the Duke de la Rochefoucault-Liancourt, who was the founder of the first school. This nobleman, when scarcely returned from exile, and when afterwards peer of France, accepted and exercised gratuitously, and with unceasing self-devotion, the functions of Inspector-General of Schools, as well as those of President of the Council of Improvement of the Conservatory, and of the Schools of Arts and Trades.

Instruction given in the Schools of Arts and Trades.

In the present state of the organization of these schools five hours per day are given to theoretical instruction, embracing principally arithmetic, geometrical drawing, with all its applications to mechanics, and also the principles of this latter science; seven hours per day are given to practical work in the shop, where the pupils are occupied in joinery, especially for framing and modelling, in founding, in smith's work, especially fitting, and in the putting together of machines, for which last kind of work most of the pupils are intended. Drawing, which is the indispensable basis of all good construction, and the intelligent practice of which leads to the solution, otherwise often impossible, of so many questions in applied mechanics, is practised with quite exceptional perfection in the three Schools of Arts and Trades. In no educational establishment, whether French or foreign, is drawing carried so far.

The success obtained by the pupils in different branches of industry and the advantageous positions they have secured, both in France and abroad, have increased the competition at the examinations for admission, and for several years past the pupils admitted possess qualifications very much superior to those previously known. The greater part of the candidates even belong less to working-class families than to parents occupying industrial positions permitting them to give their children a good preparatory education. This rise in the intellectual level of the pupils, far from being a matter of regret, is one of congratulation; and there is even ground for believing that the diffusion of technical

knowledge, which is being prepared, will also contribute to raise it still higher, and so allow the studies of the Schools of Arts and Trades to be rendered more profound without thereby drawing them aside from their true aim and object. Further, the ever increasing number of the candidates, which, in these last few years, has risen to upwards of 1,000 for the 300 or 350 admissions possible, shows that the demand, among this portion of the rising generation, for industrial instruction is not sufficiently satisfied, and that it might be advantageous to create other schools on the same plan but adapted to other branches of industry.

From the foregoing considerations, the Commission, acknowledging that the existing Schools of Arts and Trades have rendered and still render great services to industry, is of opinion:—"That there is not only ground for maintaining their organization, but also for augmenting their number, and that, while so doing, the requirements of industry should be carefully taken into account; and above all, that local or private effort should not be thwarted but rather aided in the efforts it might make in this matter." (27th sitting.)

The existing schools having been hitherto organized only with a view to the training of machine-builders, it might be an advantage to meet the wants of other branches of industry by establishing schools having more specially for their object the textile, chemical, and other arts.

Further, it is to be remarked that the financial regulations which prevent these schools, as well as other public establishments, from receiving the value of the products they manufacture, offer a great obstacle to their development and extension. At present each school has in the estimates only a credit of 50,000 francs for the expenses of the work to be executed in its shops, and when work to the amount of 50,000 francs has been delivered by the school, the price of it is paid in to the Receiver-General; so that the workshops are unable to accept and execute more important orders. It follows from this that, as the successful production, which is in itself a powerful incentive to the heads of the schools and the engineers, cannot be increased, the work done by the pupils is not always sufficiently varied in its nature. No doubt it is not right that the production of the Schools of Arts and Trades should grow sufficiently important to come into anything like real competition with manufacturing interests; but as it is of importance to the instruction of the pupils that the work should be practical and varied, it might be advisable, in the creation of new schools of the same kind,

to adopt some method leaving greater latitude in this respect. This object will be attained without difficulty whenever the institution owes its origin to local or private effort, and the State, instead of managing the schools, restricts itself to offering encouragement.

It is for this reason, and with this view, that the Commission recommends,—

“That it is desirable that certain facilities, and certain exemptions from the present financial regulations should be offered to the new and even to the existing schools, so as to permit them to increase their productive power in a manner beneficial to the instruction of the pupils, without, however, enabling them to come into serious competition with private industry, and also without weakening the control of the State over the schools it directs.” (27th sitting.)

Out-door Pupils.

While considering the extension to be given to the institution of Schools of Arts and Trades, the Commission was naturally led to examine whether the new schools which are to be created might not advantageously be organized upon the system of out-door pupils. With regard to this it was mentioned that it is the system of all establishments of the kind, of whatever degree, in Germany, Switzerland, and England.

For the young this system has its advantages and its disadvantages. No doubt a certain number of pupils turn aside from the right path, but those who do persevere in it have thereby acquired in their very youth a moral strength, enabling them to enter public life without running the dangers of the abrupt transition from the cloistered life of our Lycées and Colleges to complete emancipation; they have become men. It was observed that whatever concerns the conduct and the moral direction of the young is a duty naturally incumbent upon their families, and that the influence of the parents or of well-chosen representatives may be more salutary than the discipline of the boarding school, which, in the case of the existing Schools of Arts and Trades, is frequently troubled, in consequence of the want of early education, by disorders which call for serious and severe measures. The example of those of the Parisian Lycées, which receive only day pupils, of whom a large number live with their relatives, and in which the studies are as efficient as in the in-door Lycées, shows that study is as well secured by one system as by the other.

Besides, the out-door system allows of a discipline which can be of a very thorough character, and in all the establishments of Germany and Switzerland the supervision exercised by the teachers and the directors, seconded by the municipal authorities, is very effective. Quite recently, some unruly conduct in the Polytechnic School at Zurich, which the friendly remonstrance of the professors had been unable to check, was successfully put down by the expulsion of forty pupils.

Lastly, reasons of economy, as well in the interest of families as in that of the State, and of the administrations which found such schools, point to the advisability of establishing institutions based on the out-door system whenever the locality offers the necessary resources for enabling the pupils to lodge and board themselves according to their means.

As to the mixed system of both boarding and day pupils, it presents the inconveniences of both without realizing the advantages of either, and, to all appearance, ought to be generally rejected.

The preceding considerations have led the Commission to think:—

“That, viewed with regard to economy and the moral
 “responsibility of the State, or of local founders, and
 “in order to develop in youth a feeling of individuality
 “and of responsibility for their acts, it would be advantageous to establish Schools of Arts and Trades on the out-door system in the more important towns, but that the
 “mixed system of both out-door and in-door pupils should
 “be adopted only in exceptional cases.” (27th sitting.)

On Preparatory Establishments for Schools of Arts and Trades.

When Schools of Arts and Trades were originally introduced, and even more recently in certain Departments, it was very difficult to find pupils properly prepared to follow the course of studies with success, and hence resulted very serious obstacles to the march of instruction. But the development of manufactures has offered the pupils of these schools so many advantageous careers and positions that, as the number of candidates has increased, and the competition for admission has become more and more eager, so the preparation has been more satisfactory. The care which the administration takes to ascertain the fitness of the pupils admitted, and the measures it has adopted in consequence, have had the effect of securing more regularity in this respect.

There have also arisen within the last few years, in the great centres of population, and sometimes near the schools, establishments intended to prepare candidates competing for admission into the Schools of Arts and Trades. In many communal colleges the studies have been directed towards this competition, so that every year has witnessed an increase in the number and in the acquirements of the candidates. It has moreover come to pass, as we have already stated, that the proportion of pupils admitted into these schools belonging to families of working men properly so called, has gradually diminished, whilst the number of those whose parents hold a higher social position, has constantly increased.

There is no reason for either surprise or alarm at this modification in the character of the pupils, since it indicates a more and more decided movement, which diverts towards the industrial and independent professions a part of the young generation who had previously sought a position in the lower departments of the public service. But, at the same time, this tendency is an additional motive for offering to young workmen more numerous and easy means of acquiring the instruction they need. The classes and schools founded for the purpose of improving primary instruction, and for giving these young people the first rudiments of technical education, will also be a very good way of preparing them for the Schools of Arts and Trades.

It is evident from what precedes that the means of preparation for the studies prosecuted in the Schools of Arts and Trades are numerous, and sufficiently diffused in all the Departments, that the founding of lectures and classes intended for apprentices will further add to their numbers, and that consequently there is no necessity for devising any special measures in this direction. However, the efforts which are and will be made with this object being useful and praiseworthy, the Commission has expressed the following opinion:—(28th sitting.)

“ The preparation for the studies of the Schools of Arts and Trades is naturally found in the primary schools, and is likely to be still better secured in future by the organization of schools for improvement in this branch, and of lectures and classes intended for young workpeople; there therefore seems no necessity for the State to found or maintain special establishments for the purpose. But, at the same time, the establishments already founded, or which may be founded hereafter with this view throughout the Departments, whether by local authorities or

“ private individuals, being calculated to render good service
 “ in providing pupils for the Schools of Arts and Trades,
 “ may very properly be admitted to share in the encourage-
 “ ments given by the State. In the assignment of these
 “ encouragements it will be advisable to take into account
 “ the attention they devote to the practice of manual
 “ occupations, the improvement of which is so important
 “ to industry.”

Note by the Editor.

The system of apprenticeship in the two countries does not appear to be quite the same, and it seems difficult to see how far the suggestions for its improvement in France made by the Commission are applicable in England. In this country, however, as in France, the custom of apprenticing lads to special trades appears to be on the decrease. The recommendations for shortening the hours of labour of apprentices have been to a considerable extent forestalled in England by the half-time system under the Factory Acts, and more especially by the enactments of the Workshop Act passed last year. The system of Government inspection so urgently recommended by the Commission is already in existence under these Acts.

In this country, so far as the Editor of this report is aware, there is no machinery for apprenticing lads and watching over their welfare equivalent to the French *Societies of Patronage*. It is true they may be and are apprenticed direct from workhouses and orphan asylums; but those institutions are then no longer their homes, and the ties by which they are attached to them are, on their apprenticeship, immediately dissolved. Whether special workshops can be established for apprentices in connexion with schools without entering into competition with local manufacturers is a problem which has not yet been attempted in England, and it is doubtful if the success of such institutions in Mulhouse, Amiens, and other towns of France is an encouragement to imitate them in this country. It seems undisputed that any attempt to establish such workshops should be the result of local or individual effort, and should not fall within the province of Government.

A system, approximating in character to that by which practical instruction in the manual operations of manufacture has been introduced into the schools of Arts and Trades in France, but free from the liability to which they are exposed of entering into competition with private industry, has been for some time at work in the Royal Dockyards. Under this system a number of young men are admitted, after passing a preliminary examination, to learn the practical handicraft of the engineer and the shipwright. These engineering students, as they are called, are further aided by scholarships, and in the case of the shipwrights by free admissions to the Royal Naval School of Architecture. It is worthy of note, however, that complaints are made that many of these students, after completing their time of service in the Government factories, enter the yards of private machinists and shipbuilders, and the State is thus deprived of the results of the educational advantages towards which it has contributed so largely. Details of the provisions and regulations under which these students as well as the apprentices are admitted to and maintained in the Royal Dockyards are given in Appendix G., p. 184, of this volume.

The only institution in the United Kingdom which corresponds at all to the French schools of Arts and Trades (except that it has not been

attempted to introduce manual labour) is the Diocesan Trade School at Bristol. This school owes its origin entirely to local effort, and principally to the exertions of the Rev. Canon Moseley. Possessing the great advantage of school buildings rent-free, it is still to a great extent supported by the revenue derived from school fees, though it is very largely aided by the State. In the year 1865-66 the pecuniary grants made by Government to the masters of the school on the results of their science teaching amounts to 266*l.*, and last year to 284*l.* There are about 120 pupils belonging to the class just above that of the artizan, that is to say, their parents are petty tradesmen, master workmen, such as builders, contractors, &c. in a small way of business, policemen, excise officers, &c. &c. The annual school fee is only 3*l.* The school is divided into two sections: in the lower one of which elementary instruction, consisting of reading, writing, and arithmetic, alone is given; in the upper section—to which the boys are only admitted after passing through the lower—are taught elementary mathematics, including algebra, Euclid, and the elements of plane trigonometry, practical and descriptive geometry, machine and building construction, mechanics, both theoretical and applied, physics, and inorganic and organic chemistry. There is a roomy and well-fitted laboratory attached to the school in which the more advanced pupils are instructed in manipulation and the rudiments of analysis. With the sanction of the managers the teachers have also established evening classes in scientific subjects for working men, clerks, and tradesmen's assistants. These have been well attended since their commencement, and are increasing in popularity. It has been thought advisable to draw particular attention to this school, as it is, so far as the Editor knows, the only one—at any rate the only one supported by Government—where children, of the very class from which apprentices to manufacturing trades are drawn, can receive a scientific training bearing directly on the pursuits they are to adopt.

As the Bristol Trade School may serve as a model for similar establishments, a more detailed account of its progress and present position is given in Appendix F., p. 179.

SECTION III.—TECHNICAL EDUCATION OF WORKMEN.

DIVERS ORGANIZATIONS.

Allusion has already been made at the commencement of this Report to the serious obstacle which the absence of primary instruction in a great number of workmen presents to the progress and development of our manufactures. Without wishing to expatiate further on this deplorable state of things, it nevertheless appears necessary to show, by the example of England, what kind of difficulties this ignorance may also offer to the success of the attempts that may be made to give working men the degree of technical education necessary for them, and how important it is to establish on this point a co-operation between the efforts of the Ministry of Public Instruction and the Ministry of Agriculture, Commerce, and Public Works.

The Report of the Sub-Commission charged to visit the establishments of professional education in Great Britain, inserted in the second volume of the evidence taken before this Commission, and that which MM. Marguerin and Mothéré addressed, in 1862, to the Prefect of the Seine *on the Education of the Middle and Working Classes in England*, contain the following information respecting *Mechanics' Institutes*, which have been much talked of in France, but without any very precise knowledge of them. These reports may in certain respects serve to show the dangers to be avoided and the examples to be followed.

These institutions were first of all established in Scotland, where, by the effect of old laws, primary education was already generally diffused, and had produced the most remarkable results on the moral and intellectual development of the population. On this subject, when speaking of the Parochial Schools, the first of which were established in the reign of James VI. (1567), and which were constituted by the Scotch Parliament in 1696, MM. Marguerin and Mothéré quote the following opinion expressed by Lord Macaulay :—

“ The effects of this measure were felt in the next generation. It became evident that the people were more intelligent in Scotland than in any other country of Europe. In whatever foreign land a Scotchman might happen to be, whatever profession he might follow, in America or in India, in trade or in war, his early education everywhere gave him the advantage over all competitors. If he entered a warehouse as a porter, he soon became foreman; if he enlisted, he was soon a serjeant. Scotland, on the other hand, notwithstanding its barren soil and its rude climate, made in agriculture, manufactures, and trade, in letters and in the sciences, in every thing that constitutes civilization, such progress as the ancient world had never witnessed, and as the new world itself has hardly seen surpassed.”

This panegyric of the Scotch, which, in the mouth of Lord Macaulay, might be thought to be an exaggeration, is confirmed by the opinion of our illustrious fellow-countryman, Biot, who resided for some time in Scotland.

“ The results of education,” says the celebrated physicist, “ are such that they strike with astonishment those who observe them for the first time. A people divided by fierce civil wars, a prey to a host of different religious fanaticisms, imbued with gross superstitions, has been metamorphosed into a united, moral, religious, tolerant, and enlightened nation. The Scotch, poor, and inhabiting a country by

“ no means fertile, have risen by their education and
 “ civilization to the level of, and, if the lower orders are
 “ considered, have surpassed, a nation which is regarded as
 “ one of the most enlightened on the face of the earth.
 “ They have rivalled it in trade, equalled it in manufac-
 “ tures, and surpassed it in agriculture. Wherever a Scotch-
 “ man goes, the education he has received in the parish
 “ schools gives his mind a peculiar power of observation,
 “ and enables him to extend his view far beyond the range
 “ of objects which occupy the attention of persons of the
 “ same social status who have not been so educated.”

These testimonies, which show the immense and immediate advantage that the general population of a country may derive from merely elementary instruction properly developed, ought, at the same time, to enlighten us as to the course to be followed and the conditions to be fulfilled, in order to secure the success of the technical education of working men. In fact, the failure of the first foundations of this kind attempted in England, about 1825, under the name of *Mechanics' Institutes*, like those which since 1800 have succeeded in Scotland, under the direction of Dr. Birkbeck, who was their first founder, proves that it is of paramount importance first of all to make sure that the workmen for whom the lectures are intended have received as sound and complete a primary education as possible. Thus, whilst in Scotland the Parochial Schools had spread among all classes of the population an amount of instruction about equal to that which the French law of 1833 defined as *superior primary instruction*, the day and evening classes of the Mechanics Institutes obtained a complete and almost general success, “ in England, on the contrary, the teachers
 “ in these institutions had scarcely begun to talk of science
 “ to the mechanics when they encountered an obstacle
 “ which had not been found to exist in Scotland to the same
 “ extent. The absence of elementary instruction was complete.* Lord Brougham and his friends were in advance
 “ of their age Of these institutions there soon remained nothing but the name and the building, which
 “ last was used for other purposes. In most cases, it was
 “ occupied by a mechanics' or middle-class club, where
 “ persons who paid a small monthly contribution met to
 “ amuse themselves on winter evenings. There was no
 “ such thing as teaching.”

It would be a mistake to conclude from the number of

* Report of M.M. Marguerin and Mothéré to the Prefect of the Seine, p. 22 *et seq.*

these institutions, at present amounting to about 1600, that England is so well provided as might be desired with establishments in which public lectures really offer the working population the technical instruction it requires.

But, if the want of primary education was the cause which frustrated the first attempts of a band of noble-minded men to provide technical instruction for the working people of England, the promoters, on finding that this essential foundation was wanting, applied themselves with the same devotion to the task of diffusing elementary knowledge in order to prepare a new generation to receive an education of a superior degree. Such is the end to which the first efforts of all the friends of popular instruction must be directed, and such is the motive which justifies an appeal to the co-operation of the ministry which has the mission of promoting education in all its branches. When this indispensable result shall have been attained the organization of courses of popular lectures like those of the Mechanics' Institutes of Birmingham, Liverpool, Manchester, and Glasgow, and those established at Mulhouse and at Guebwiller by M. Bourcart, will become easier and its effects more certain.

The above-mentioned report of the Commission charged to visit the establishments of Great Britain, and which forms a part of the documents of the Inquiry, contains numerous papers to be consulted, and in Note V. will be found further interesting information on these institutions. They are extracted from MM. Marguerin and Mothéré's report, and to them are added others relating to the regulations adopted at Guebwiller by M. Bourcart, at Mulhouse by the Industrial Society, and at Lyons by the founders of the professional courses.

RESULTS OF THE PRECEDING INFORMATION.

We have dwelt at length, in the preceding pages, on the difficulties attending the organization of popular education in the Mechanics' Institutes of England, on the obstacles arising from the ignorance of the portion of the population it was intended to enlighten, on the modifications which have been found indispensable, and on the successful manner better adapted to the national spirit of our working men, with which it has been introduced at Guebwiller and adopted at Mulhouse, as well as at Lyons, because there result from this examination consequences which must not be over-

looked whenever we have to estimate the value of the projects which may be entertained to attain the same end.

The first of these consequences has been expressed by the Commission in the following terms:—

“ The Commission, convinced that the indispensable basis
 “ of the technical education to be given to working men
 “ is elementary instruction, extended in proportion to their
 “ wants, recommends that the Department of Public In-
 “ struction should persevere in the measures which it is
 “ constantly taking to diffuse and strengthen primary educa-
 “ tion, and should establish for the benefit of young men and
 “ artisans already engaged in the labours of their trade,
 “ evening and Sunday schools intended to improve, develop,
 “ and complete the knowledge they have acquired at school.
 “ In this recommendation it also includes courses of lectures
 “ or classes for the improvement of girls on Sundays or in
 “ the morning of working days.” (29th sitting.)

The co-operation of the Ministry charged with the superintendence of general education with that which is to have the direction of technical instruction being thus obtained, it will always be easy to harmonize in the establishments where these two kinds of education are given the action of the agents of these two departments, who ought to be actuated solely by the thought that they are fulfilling a public duty.

GENERAL ORGANIZATION OF THE INSTRUCTION TO BE GIVEN TO APPRENTICES AND WORKMEN.

Having laid down this preliminary basis, the Commission next examined the two methods that may be followed for diffusing among the working classes the technical knowledge they require.

The one most generally and almost exclusively adopted in France, consists of lessons and courses of lectures more or less public, generally gratuitous, and in a few instances subject to the formality of the pupil entering his name.

It will be remembered that, in 1819, the first industrial courses of lectures were founded and organized in various towns of France, by the zealous efforts of Baron Charles Dupin. Responding to an appeal, in which he eloquently invoked the memory of Gaspard Monge, many pupils of the Polytechnic School, chiefly officers of engineers and artillery in the towns where they were in garrison, engineers of the Bridges and Roads and of Mines, placed themselves at the disposal of the municipal authorities to diffuse a knowledge of science among the industrial population of every class.

Of all these educational undertakings, the best organized and the most successful was the institution founded by the town of Metz, with the aid of MM. Poncelet, Bergery, and Bardin. The first named of these gentlemen, ardent in the propagation of science, then entered on the course which he has since followed with such distinction, and which led him to explain, by the aid of the rudiments of elementary geometry, most of the principles and delicate problems of mechanical science. To him belongs the honour of having shown that it is not so difficult as might be supposed to popularize and bring within the grasp of ordinary capacities the study of all the propositions of industrial mechanics.

Since M. Poncelet, others, following in his steps, have sought to extend the same mode of teaching in the public lectures of the Conservatory of Arts and Trades, and in those of the Polytechnic and Philotechnic Associations, and their efforts have been attended with results of immense value. The first-named of these associations instituted in 1830 popular lectures, which were from the very beginning exclusively intrusted to ex-pupils of the Polytechnic School. These lectures have since been established in every quarter of Paris, and, in 1860, this same association founded in the amphitheatre of the School of Medicine isolated lectures, which, in their turn, called public attention to this particular mode of disseminating useful knowledge among the people.

But it would be wrong to lose sight of the fact that public lectures, or merely oral teaching, even when accompanied by experiments made with the aid of good models and of applications to common questions, often leave on the memory and understanding of the auditors only evanescent impressions. This effect is still more certain when the audience, composed exclusively of apprentices and workmen, is only prepared for the instruction given by an imperfect elementary education, which has not prepared them for mental effort, whilst their professional habits unceasingly draw them towards practical and material results. The consequence has been that, notwithstanding all the talent and zeal of the professors of public lectures, whether in Paris or in the large towns of France, this mode of teaching, in so far as it is specially devoted to working men, has not produced all the results its founders expected, although truth compels the acknowledgment that it has not been altogether fruitless.

The object apprentices and workmen have in view when they come, after their daily toils, to devote to study the

time they borrow from their rest, is to acquire the technical information which they can most readily turn to account in the trade they follow. The most rational course, therefore, that can be taken seems to be that which from the very outset gives them palpable evidence of the practical advantages to be derived from their studies. The lectures must, therefore, be followed as closely as possible by the applications suiting the instruction. For all the arts of design these will be geometrical or artistic drawings, details of construction, of forms, of dimensions, &c. ; for the chemical arts, manipulations, trials of tests, experiments in dyeing, &c. ; for the textile arts, the professor will proceed to an examination of the raw material, the preparing and working of looms, &c.

The adoption of this rational and necessary course of technical instruction leads to the abandonment of purely oral lectures in favour of regular classes, in which the pupils, after hearing the principles explained, are called upon to execute the practical applications of which those principles are the base. These applications will not only show the pupil in what sense, and often within what limits, he must follow the rules laid down, but, what is still better, they will frequently serve as a demonstration *a posteriori*, and give him that faith and confidence in the rules of science which are wanting in so many eminent men who have confined themselves to theoretical studies.

Lastly, from the very fact that he ought to proceed, at the very outset, to the immediate application to practical questions of the principles enunciated, it is evident that the teaching intended for apprentices and workmen must follow a method as simple and as little dogmatical as possible. It must not be forgotten that the workman, intelligent, but unprepared by scientific study, will always more clearly understand the principles which visibly proceed from the facts brought to his knowledge, than by the aid of the clearest and most conclusive reasoning. But besides this, when a series of different facts shall have been manifested to him as the application of the same principles, he will be led far more naturally to admit their generality and make them in future the rule of his labours. In this manner, geometry, with most of its applications, the rules for the drawing of plans, those for the measuring of surfaces and solids, etc., the principles of mechanics, as well as those of physics and chemistry, may be simply and gradually developed and proved by methods free from all technicality, and well nigh from all scientific reasoning, which is calculated to astonish and discourage minds insufficiently prepared.

It must not be supposed, however, that this in appearance somewhat familiar method of instilling scientific notions into the mind in any way weakens their efficiency or their further development. Far from having any such effect, by engraving on the mind the principles of science based on well established facts, it gives the pupils a consciousness, through conviction of the truths thus acquired, which enables them to advance with firmer steps in the path of higher studies. As a proof of this we may adduce the success obtained at the Polytechnic School and the Central School of Arts and Manufactures, by several of the pupils of these humble Schools of Arts and Trades whom a fortunate combination of circumstances had enabled to make such progress in their studies as to obtain admission into those first-class establishments. In support of this opinion we might also cite the names of many distinguished engineers, who, having commenced their education in the Schools of Arts and Trades, have acquired by study, by practice, and by the sort of intuition which the latter gives, a degree of skill and tact which the pupils of our great schools cannot always surpass with all their scientific training.

One immediate conclusion from the facts above stated is that drawing, in all its applications, may and must be regarded as one of the simplest and most direct means which technical education can employ, since it renders visible to the eye and perceptible to the mind most of the propositions of elementary and descriptive geometry with their applications, and likewise affords the means of submitting to calculation many mechanical phenomena and the proportions of the constituent parts of machines. Moreover, in all that concerns the art of construction, drawing familiarizes the pupil with execution and with the proportions which science or practice have sanctioned.

All these considerations have led the Commission to propose:—

“1. That for the instruction of apprentices and workmen, it is advisable to encourage, in preference to purely oral lectures, the establishment of regular classes to be held especially on Sundays or in the evenings of working days.

“2. That this teaching should not be at all dogmatical, but should make it a rule to explain in the simplest possible manner the principles of science by the aid of facts, and by showing their application.

“3. Lastly, that drawing, with all its applications to the different industrial arts, should be considered as the principal means to be employed in technical instruction.”

PRINCIPAL DIVISIONS OF INSTRUCTION FOR WORKMEN.

In towns of moderate size, where the number of pupils, and consequently of professors, will be rather limited, it will generally be found advisable to unite pupils of equal proficiency in one class ; thus, there will be no other divisions to introduce but those indicated by the degree of progress in study. But the case will be very different in large towns, and, whenever the number of pupils shall exceed 40 or 50, it will be necessary to form several classes. It will then be advantageous to place workmen of the same or similar trades under a common course of instruction, which may be more particularly adapted to their occupation.

Though it is impossible to indicate in a general report all the divisions which the requirements of local industries may thus introduce into technical education, still there are certain trades in which many workmen are engaged whose co-operation is indispensable to all the others, and for which it is possible to indicate the method in which the work to be executed by the pupils in their classes ought to be conducted. Among these industries, that of building is at once the most general, and also comprises the largest number of different trades, all having recourse to the art of drawing, and requiring the rules of geometry and sometimes even those of mechanics. Moreover, it may be noticed that the labours of these different trades all contribute to one and the same end, and that it is consequently desirable that the workmen who practise them should follow a similar course of study. It will therefore often be practicable to form a special class for all employed in the building trade, including masons, stone-cutters, carpenters, smiths, joiners, and other accessory trades.

The technical instruction to be given by drawing in this class, and which will likewise serve as applications of the rudiments of geometry and projection, will comprise the principal details of the labours of each profession. Masons and stone-cutters will learn to draw the different modes of construction to be employed, according to the nature of the materials and the parts to be executed ; simple and mixed masonry, chimneys, the different kinds of arches, and their intersections and their voussoirs and templates, staircases, &c. To these studies may also be added the actual execution, in plaster-of-Paris, of all the masonry of certain parts on a small scale, a proceeding which has been practised with success in certain schools of France and Germany. Carpenters and joiners will also execute working drawings of

roofs and constructions in wood, and so on with other trades.

In towns where there are machine-workshops, it will be advantageous also to form a special class for engineers, for the purpose of making drawings of the more important portions of machines, especially of such as are peculiar to the locality or are most used. The series of designs executed by the pupils of the Schools of Arts and Trades may be taken as types of the mode to be adopted. The artisans engaged in the different trades working in metals may be joined to this last class, unless there should be in the neighbourhood some special factories employing a great number of hands, as in the manufacture of clocks and watches, hardware, or locks, for whom a separate class ought then to be opened.

In one word, the object of these classes being to give each workman the technical instruction required in his trade, every effort must be made to teach him to execute drawings of the articles he has to manufacture, employing them as means to make him comprehend the principles of geometry, which he will be taught at the same time. He may also be required, as an application of his knowledge, to calculate the surface, volume, and weight of the objects drawn, when their forms are not too complicated.

It has been deemed necessary to enter somewhat minutely into these details, for the purpose of showing that this kind of instruction can only be successfully given by men who are fitted for it by their profession, or who, from enthusiasm, have devoted their attention to learning all the practical details. From this it is evident that the teachers must for the most part be found among engineers, architects, builders, and foremen, who, without abandoning their profession, will undertake the direction of these Sunday or evening classes.

In Note VI., p. 156, will be found information respecting the different schools intended for teaching the building arts, which have been founded in several States of Germany. These institutions, which are in operation chiefly in winter when work is suspended, might be imitated with advantage, either in the great centres of population or in the Departments which supply the majority of the workmen engaged in the building trade.

ON PAYMENT BY PUPILS.

Experience has demonstrated in most of the countries where lectures, classes, or societies for the education of workmen have been established, that these institutions

seldom prosper or produce any very beneficial results, unless the principle of payment by the pupils is admitted. It has been found by all persons who have taken an interest in these matters that the working man sets no real value on what he gets for nothing, and that however small the payment required, it ensures constant attendance. Many schools opened on the gratuitous principle were soon neglected and at last totally deserted; but when payment was afterwards exacted, they were attended with great regularity. The drawing schools in the kingdom of Würtemberg supplied a remarkable instance of this when they were first established.* At Lyons, the monthly payment is only 50 c., and it suffices to secure regular attendance. The same principle has been adopted at Guebwiller and Wesserling, and the Industrial Society of Mulhouse has also admitted it in the project of its *Society for the Instruction of Workmen*, which has been mentioned already.

Experience also proves that by giving the workmen who follow the lectures a large share in the management and in the maintenance of order, they take an interest in the success of the general institution. Of their own accord they impose on themselves rather severe rules as to attendance, and even fines, the proceeds of which they appropriate either to the minor expenditure of the classes, or to the increase of the library. In all such institutions a library is an indispensable adjunct. It furnishes the means of facilitating instruction, and possesses the still more valuable advantage of habituating workmen to the reading of good books, whether they consult them at the library, or, which is still better, borrow them to read at home.

It may be well to add that the admission of the general principle of payment does not absolutely prevent the remission of the fee to those industrious and deserving persons who cannot afford the money on condition of punctual attendance. When the financial management of the classes is left almost entirely to the working men who form them, the promoters may safely trust to their severity for preventing gratuitous admission from degenerating into an abuse, and to their sense of justice for granting it whenever deserved.

For these reasons, the Commission:—

“Thinking that the principle of the regular payment of
“ a moderate sum is more compatible with the dignity of

* Report on the educational establishments of the kingdom of Würtemberg.

“ the workman than gratuitous admission, and that it is a
 “ guarantee of punctuality and assiduity, has decided that
 “ this principle ought to be the general rule for the esta-
 “ blishment of lectures and classes intended for the tech-
 “ nical instruction of workmen. But at the same time it
 “ leaves the promoters and attendants of these lectures
 “ and classes the faculty of granting gratuitous admission
 “ whenever they consider it proper.” (29th sitting.)

PUBLIC LECTURES.

Though, for the technical teaching of workmen disposed to devote part of their leisure to studies which may be useful to them, it has been thought proper to give the preference to regular classes over public or simply oral lectures, it does not follow that such lectures, or even occasional meetings, may not be really useful. There are, in fact, a great many scientific and technical questions which possess great interest, not only for the workmen themselves but also for their masters, for young men, and indeed for a host of people who would not submit to a regular attendance at such classes as those of which the organization has just been described, and which require punctuality and practical application. On the other hand, certain special branches of science, though very desirable to be learned, do not always admit of regular teaching, nor of any considerable number of lessons. A person, well versed in the theory and practice of some particular art, might be disposed to give a few lectures on the subject he has mastered, but would not choose to give a course limited to workmen only. Giving public lectures and holding meetings in such cases cannot be otherwise than beneficial, and although they are not so effective for the technical instruction of workmen, properly so called, as regular classes opened expressly for them, the fact is none the less certain that, by diffusing and popularising science and experience among the public who attend them, much good will be done.

The success of these modes of teaching, like that of the classes intended for workmen, would be still more certain if they were subjected to the principle of making a payment, however small its amount might be. Besides the more regular attendance of the audience, the professor would have the satisfaction of witnessing on the part of those present a more sustained attention, which could not fail to stimulate his zeal and attention. Here, as previously explained in adducing reasons for this opinion, the principle of gratuitous

admission should not be applied without examination, and then the free admissions granted to laborious and punctual students would be a powerful stimulus to study for the young people and workmen of slender resources.

For this reason the Commission has come to the following conclusion :—

“ Under the circumstances mentioned, and with the reservations already made, it would also be advisable to encourage the institution of lectures and conferences on subjects connected with technical instruction.” (29th sitting.)

AGRICULTURAL INSTRUCTION.

The Commission, in carrying out its investigation, could not overlook the questions connected with agriculture, the nursing mother of all the other arts, and it has heard with extreme interest the statements which have been submitted to it on this subject by the Director of Agriculture in the Ministry of Commerce. The information so obtained has convinced the Commission that agricultural instruction in different degrees, given by the State, has already entered on a very satisfactory course, and that it will suffice to extend and encourage the attempts so made, in order to satisfy all requirements.

There now exist in France 50 Farm-Schools for giving theoretical and practical agricultural instruction of the first degree to youths who intend to follow the occupation of farm-servants. The expenses, so far as regards the salaries of the masters and partly of the board of the pupils, are defrayed by the State; but all the outlay and risk of the farming are borne by the director. The whole expenditure of the State for each of these 50 establishments amounts on the average to 14,000 fr. or 15,000 fr., and instruction is given to about 1,500 apprentices, which corresponds to an average of 30 pupils for each farm, at an annual cost of about 250 fr. per head. The results of the technical and practical teaching given at these farms are in general satisfactory, and the development of such primary agricultural institutions cannot be otherwise than beneficial.

Above these first schools, and as establishments of secondary instruction, there are the three agricultural district schools of Grignon, for the Departments near Paris, of Grandjouan for the western coasts, Brittany, and the Landes, and of La Saussaie for the region of Lyons and La Dombes. Each of these schools has six professors, and the course of study, which extends over two years, is ter-

minated by examinations, at which the pupils who give satisfaction receive certificates.

The Agronomic Institute (*Institut Agronomique*) of Versailles, was founded at considerable cost; professors of the highest merit were appointed after a public competition; the course of instruction included all branches of agricultural science, and was illustrated by the results of experiments of every kind made on the land belonging to the establishment. The suppression of this institution may have been a measure dictated by considerations of a high order, but would nevertheless be much to be regretted if it should not be possible to find some compensation hereafter.

The proximity of the district school of Grignon, which is now connected with Paris by rail, may perhaps allow of developing the instruction given there by imparting to it a higher character and extending its sphere. Able professors might be appointed to it, and then agricultural science would cease to be in France deprived of the advanced teaching which it possesses in many German States. In fact, it must not be overlooked that this science is one of the most delicate and most difficult to study, owing to the multiplicity of the elements influencing its results. A very extensive knowledge, both theoretical and practical, of natural history, physics, chemistry, meteorology, animal and vegetable physiology is necessary for those who seek to investigate profoundly the phenomena of the life of plants and of animals, and at the same time to improve the processes and implements of cultivation.

The highly scientific teaching of the Garden of Plants (*Jardin des Plantes*), and at the Conservatory of Arts and Trades (*Conservatoire des Arts et Métiers*), however useful it may be in expounding the theories and the laws of science, is unable to advance their progress, because, not having the means of making experiments on a large scale, it cannot bring theory and practice into direct combination. It is, therefore, desirable that the existing system of agricultural instruction should be completed by the formation of an establishment of a higher order than any yet founded.

Besides the schools of the State there are establishments of an unpretending kind, intended to train either good farm bailiffs or simply agricultural labourers and maid-servants. Owing their origin to charity these private institutions find their pupils among the poorest and most destitute of the youthful population. Some have already been mentioned, as the orphanages of Bouffarick, in Algeria, for boys, and those

in Alsace for girls, classing them among the schools for agricultural apprentices. The agricultural colony of Met-tray is of the same order, and renders no less valuable services. All, as well for their moral tendency as for teaching the best agricultural processes, deserve the favour and encouragement of the State. It has been deemed advisable to call particular attention to that class of establishments which, being intended to train female farm servants, tend to retain in the rural districts and employ in field work the young girls whom the attractions of lighter labour, but less favourable to health and morals, are continually drawing towards factories or workrooms for sewing and embroidery. If the vigour and energy of the rural populations is to be preserved, measures must be taken to retain not the men only, but also the women.

The whole of these considerations has induced the Commission to express the two following opinions:—

“ 1. Independently of the agricultural teaching given by the State, and which it is important to maintain, develop, and complete, the encouragement of the Government should be granted to similar establishments which are or may be founded by the departmental and communal authorities or by private individuals.”

“ 2. The industrial and agricultural instruction of females is no less deserving of the solicitude and support of the Government than that of the other sex. The encouragement of the State may, therefore, be beneficially extended to establishments founded for the improvement of the primary education and the development of the technical instruction of girls and women, always, however, giving the preference to such as would not have the effect of withdrawing them from rural occupations (28th sitting).”

ON THE INDUSTRIAL EDUCATION OF GIRLS.

It is impossible to overlook the utility and the services of the institutions for giving girls an elementary education as well as teaching them the practice of the trades best suited to their sex. Under divers designations they have been founded in many of our cities by charitable associations altogether unconnected with the State, belonging to different religious communities.

There are several in Paris which deserve to be pointed out to the attention of the Government and of persons who may be disposed to attain the same end. The Commission

has been deeply interested by the deposition of the able directress of a school founded by the efforts of certain charitable ladies for the purpose of preparing girls for situations in trade and manufacture. The founders, who have formed an association under the title of *Society for the Professional Education of Females*, were at first 50 in number, but have now increased to 411. The pupils who, at the beginning in 1862, were only six, increased in 1863 to 40; in 1864 to 75 or 80; and in 1865 to 146. The studies are divided into, firstly, general studies, comprising grammar, arithmetic, history, geography, and some few rudiments of the sciences; a course of ethics has been added, especially devoted to the domestic and social duties of women; secondly, studies relating to trade, such as book-keeping and correspondence, drawing applied to manufactures, and also practical exercises in sewing. In Note II., p. 125, will be found more circumstantial details on the organization of this altogether private institution, the success of which in Paris seems to prove that it tends to supply one of the most deplorable deficiencies in the organization of female education.

The establishment here briefly described is especially intended for the daughters of overseers in factories, clerks, petty tradesmen, and the better sort of work-people. But there are many of a humbler kind which receive poor girls, sometimes altogether friendless, to give them both elementary and religious instruction, as well as to teach them a trade suitable to their sex; of this class are the Orphanages of Calvados, which have been already mentioned, and are described as to their organization and results in Note II: what has been already said about them must suffice. The Commission is desirous of noticing the services which these institutions render in training work-women more or less skilled, and especially in imbuing them with moral and religious principles. But it is advisable to suggest that instruction in such delicate arts as needlework, embroidery, lace-making, and others commonly taught in towns, should be limited, and that as regards country girls, they should only be taught what may be useful to the wives of farm labourers and country work-people, in order not to strengthen their too prevalent inclination to flock towards large towns.

Note by the Editor.

Even before the date (1862) of the report of Messrs. Mothéré and Marguerin a remarkable movement had commenced among the promo-

ters of mechanics' institutes in England, ameliorating considerably their organization and developing the objects for which they were originally established. The history of mechanics' institutes is not without interest. When originally founded in nearly all large towns of the kingdom, they were intended, as their name applies, to promote the education of the adult artizan, and with this end in view courses of lectures on scientific subjects were established in each of them. Chiefly owing to the want of elementary education, as pointed out by the Commission, these courses proved a failure, and they were supplanted by single lectures of a more popular character. It was soon found that the lectures, when made sufficiently amusing, became a source of pecuniary profit to the institution, whence arose the musical lecture, with vocal and instrumental "illustrations," dioramic and other entertainments. In some cases mechanics' institutes became mere places of amusement for the less wealthy section of the middle class. For seven or eight years, however, a considerable change has been coming over many of the mechanics' institutes, (under this title are included many institutions of a similar description, as working men's institutes, popular institutes, &c., &c., which, under different names, have been founded with the same object,) and they are now reverting to the original educational theory under which they were established. Some of them, as for instance those at Manchester and Huddersfield, have attached to them elementary day schools, and in nearly all evening classes have been formed, not only for primary instruction, but also for that in science and art. This latter object has been greatly promoted by the assistance offered to the successful teaching of elementary science by the Government. A glance at the table in Appendix D., p. 168, showing the number of science classes connected with the Science and Art Department, will show how many of them are established in mechanics' and similar institutes.

On referring to the brief abstract of the scheme given in Appendix A., at page 163, under which the Government grants in aid of science and art education are administered by Government, it will be seen how far the recommendations made by the French Commission, as to the programme of instruction for working men, have already been adopted in this country. As in France it is found that artizans will value most what they have to pay for, and accordingly one of the essential features of the Government scheme is that the pecuniary grants are only supplementary to local effort. In all cases teachers and institutes are recommended to raise the class fee as high as possible.

The importance to the working classes of courses of lectures on popular science by able lecturers has also been recognized in this country. For some years past the professors of the Royal School of Mines have given courses of evening lectures on different branches of science. These being intended for the benefit of the artizan class, the fee of admission is almost nominal. Details of the attendance at these lectures are given in the Appendix C., at page 167.

Special instruction in agriculture for the rural population has not been attempted in this country. The difference between the social and industrial position of the agricultural labourer here and that of the small farmer in France precludes at present the example of that country in this respect from being followed. Some years ago an agricultural college was founded at Cirencester, but it is intended for pupils of more ample means.

SECTION IV.—SUPERIOR TECHNICAL INSTRUCTION.

GENERAL OBSERVATIONS.

AFTER devoting its attention to the very deficient means of instruction placed within the reach of apprentices and workmen in France, the Commission attentively considered the question whether in the present advanced state of manufacture, and in presence of the imperious necessity felt more and more intensely for the co-operation of the mathematical, physical, and chemical sciences, the existing establishments for scientific education, such as the Polytechnic School with its dependencies, the Schools of Application (*Ecoles d'application*), and the Central School of Arts and Manufactures were sufficient to meet all the requirements of the public and private services.

These superior establishments, which, especially the first, have served as types for similar institutions abroad, prepare for the said services:—the Polytechnic School, not more than 130 or 150 young men, two-thirds of whom enter the army; the Central School about 200, who devote themselves to industrial occupations, whilst the number of candidates for admission is three or even four times greater. The result of this excessive competition is that, after laborious and expensive studies, a large number of youths who have as yet acquired only the first theoretical rudiments of mathematical science, and have no technical knowledge whatever, find extreme difficulty in fixing on a profession. Thus France, for a population of 38 millions, has only two establishments of superior technical education, and they do not supply for the scientific arms of the artillery and engineers, and for industry, more than 350 or 400 young men.

It is well known, on the contrary, from authentic information collected in Germany and Switzerland that there is in that part of Europe a polytechnic institute for every 5,500,000 inhabitants, and that the number of pupils to whom technical instruction is given therein amounts to nearly 4,000, even while counting for some of them and especially for the Zürich Institute, only the pupils regularly matriculated and obliged to attend the classes. The following table gives the

number of pupils attending the Polytechnic Institutes of the German States :—

	Number of Pupils.
Hanover - - - - -	100
Brunswick - - - - -	200
Berlin - - - - -	350
Dresden - - - - -	240
Nüremberg - - - - -	60
Munich - - - - -	172
Vienna - - - - -	900
Prague - - - - -	718
Stuttgart - - - - -	270
Carlsruhe - - - - -	589
Zürich - - - - -	265
Total - - - - -	3,864

Of course all these young men do not derive equal profit from the instruction given. But in addition to the fact that the discipline and superintendence of the studies is very strict in these establishments, the pupils are subjected to formidable examinations, as well for passing from one division to another as for obtaining the diploma which, under the name of *certificate of proficiency*, is given to the most advanced on leaving. The number of these certificates does not, on the average, amount to more than one-half or even one-third of the number of pupils admitted. There can be no doubt that the large number of these establishments for superior scientific and technical education, which have been enlarged or founded in Germany during the last 30 or 40 years, must have powerfully contributed to the progress of the sciences themselves by multiplying the number of men who cultivate them, and to that of industry and the arts by initiating so many young men in the technical principles which ought to direct their practice.

The above made comparison has indeed been met by the objection that the Government schools of superior instruction were sufficient for the requirements of the public services, and that if the number of pupils or of establishments were increased beyond the necessary limits, there would be some danger of diminishing the real value of the persons educated. But it must be remarked that the Polytechnic School only furnishes candidates for the public services, and chiefly for the army, and that the Central School has hitherto

directed the majority of its pupils towards the art of constructing machines or railways, to the progress and development of which they have indeed largely contributed. However, this special direction is far from meeting all the varied wants of industry.*

Though our railways have now attained a considerable development, they are still far from satisfying the wants of agriculture and trade. On all sides, following the example set by the Department of the Lower Rhine, other districts are preparing to execute numerous lines to meet the trunk-lines, and if these undertakings are less important than the great railways, their number will long afford employment for the engineers who devote themselves to that branch of art. What further proves that the number of scientific and well educated engineers able to conduct extensive works is not excessive, and is even far from meeting the demand, is the fact that the great railway companies are eager to obtain the services of the more distinguished Government engineers by offering them salaries not disproportioned to the services rendered, but greatly exceeding those offered by the State, or those which would be paid if the choice extended over a greater number of persons. Thus, at the present time, most of the great railways have as directors and heads of the different services engineers of Bridges and Roads (*Ingénieurs des Ponts et Chaussées*), and of Mines (*Ingénieurs des Mines*). It is just the same with the navigation companies, who obtain their naval engineers from the Imperial Navy. Therefore, if the wants of the State are satisfied by the Polytechnic School, it cannot be truly asserted that the Central School suffices for all the requirements of industry.

Moreover, would it not be well to think of those numerous candidates, who, after long and expensive studies, most frequently limited to the theoretical rudiments of mathematics and elementary physics, have failed to obtain admission to the two great schools mentioned above? Would it not be of advantage to offer them the means of completing their elementary education by technical studies, which would enable them to utilize to the benefit of industry whatever knowledge they may have acquired instead of leaving them to seek inferior clerkships in public offices?

There are also motives of another order for desiring that, wherever the requirements of industry demand it, establish-

* A course of naval construction has recently been added to the curriculum of the Central School.

ments of superior and technical education should be founded analogous to the Central School.

Situated in Paris, in the focus to which unceasingly converge all the men most eminent in science and the arts, the Central School has been able to create a corps of professors who have given its studies and its pupils a value which, very probably, could be with difficulty secured in the provinces. But by the side of this indisputable advantage, which will assure for a long time at least, its superiority over all similar establishments that may be founded elsewhere, the fact of this school being established in Paris presents a serious difficulty to many families. The cost of the instruction given to its out-door pupils is 875fr. per annum, and the whole expenses of a pupil are rarely less than 2,500fr. or 3,000fr. a year, exclusive of clothes. Now there are few parents whose means allow them, after paying for the ordinary school teaching, to make a further sacrifice of such an amount for three more years in order to give their sons a professional education. But, besides the heavy expense, Paris offers to inexperienced youths many temptations and dangers, which often compromise their future, and many parents are alarmed by the risks of misconduct to which the young men are exposed when left entirely to themselves at their entrance into life.

In Germany and Switzerland, the total of the school fees ranges from 100fr. to 150fr. Living is not dear there; for 1,000fr., and sometimes less, a young man can easily obtain proper board and lodging. A quiet locality is favourable to regularity of study, and it is a matter of astonishment that, with the facility of communication afforded by railways and the greater appreciation of the acquisition of living languages, a more considerable number of young Frenchmen have not gone to Germany to secure, at little cost, a complete course of instruction of so high an order, and at the same time to learn the language of the country.

Similar advantages, so far as regards technical instruction, might be obtained in France by the founding of establishments of superior technical education, principally intended to meet the wants of the more important industries of the localities where they are situated. Lyons, already, by the private efforts of enlightened citizens, has organized a central school, which counts no less than 86 pupils.

TOWNS IN WHICH SUPERIOR TECHNICAL SCHOOLS MIGHT BE FOUNDED.

East.—Lyons, the centre of the region of the Rhone, already possesses the celebrated Lamartinière School, and the School for Professional Education, and has set besides the example of establishing a Central School from resources obtained by a local subscription (Note VII., p. 159). Without in any way interfering with the independence of this new institution, its praiseworthy efforts might be encouraged in various ways. The curriculum might be organized to train machinists, architects, chemists, silk and ribbon manufacturers, silk growers, agriculturists and wine growers, merchants, &c.

Alsace, which has shown itself so keenly alive to the wants of its population and manufacturers, and has taken care that every inhabitant shall be able to read and write, is so well accustomed to provide by its own efforts, without soliciting the aid of the State, whatever educational institutions may be wanted, that it would be superfluous to stimulate its zeal in this respect.

The different institutions founded by private individuals for the purpose of imparting instruction to workmen, and to youth who intend devoting themselves to some branch or other of the industrial arts, have already been cited as models worthy of imitation. There is, however, reason to think that the great metallurgic industries, those of machine making, of dyeing, cotton printing, brewing, chemical manufactures, and agriculture, so extensively developed in the Departments of the Upper and Lower Rhine, the Vosges, the Meurthe, the Moselle, and the Doubs, might make still greater progress with the aid of a superior technical school for giving theoretical and practical instruction to architects, builders of factories, metallurgists, machinists, manufacturing chemists, and agriculturists. Situated in the midst of all the industries for which it would train recruits, who would be able frequently to visit manufactories which, in that enlightened district, are always open to those who seek instruction, such a district school might combine with theoretical instruction the technical and practical teaching, which it is more difficult in some respects to obtain in Paris itself.

North.—In the group of the northern departments, where notwithstanding the extensive development of industry, popular education is still unfortunately so backward, and the morals of the working classes are far from being of a high standard, great efforts would be required to overcome the habits of indifference which would seem to have grown

inveterate. Laudable attempts have been made already, and they deserve encouragement.

Lisle, the centre of the beet-root sugar manufacture, where spinning mills, engineers' workshops, and steam factories are numerous, where agriculture and the accessory arts are prosperous, appears to be naturally designed, in that part of the empire, for the seat of a technical school for machinists, architects, manufacturing chemists, and agriculturists. To this establishment would come students of the Departments of the Nord, the Pas-de-Calais, the Aisne, and the Ardennes.

South.—Marseilles, with its magnificent new docks destined to extend its relations with the Levant and the Indies to a degree that cannot be foreseen, its shipbuilding yards, which will be developed more and more, and its important chemical works, is naturally indicated as the seat of a large technical school for the training of hydraulic engineers, builders of steamers and sailing vessels, constructors of marine engines, manufacturing chemists, shipowners, and merchants. The inhabitants of the city which has made, at its own expense, the splendid canal bringing the waters of the Durance within its walls, would certainly not shrink from the task of founding such an establishment intended to diffuse scientific and experimental knowledge among an intelligent and enterprising population, which has hitherto taken too little interest in such studies.

West.—The department of the Lower Seine has already organized at Rouen courses of lectures on the application of the sciences to industry and agriculture, and it would be sufficient to give this establishment a character of completeness better suited for serious and methodical studies than public lectures altogether uncontrolled. Such an institution would educate machinists, architects, shipbuilders, manufacturing chemists, and manufacturers of cottons, woollens, &c.

In all the great centres of manufacturing industry, the proximity of workshops of all kinds would greatly facilitate the applied studies, if the practice were introduced, as at the school of engineers and artillery at Metz, of making plans of buildings, factories, and works, with descriptive texts, and in this respect means of instruction would be available which are wanting to the Central School at Paris, and for which the high scientific attainments of the professors offer no adequate compensation.

Without anticipating the questions which will be treated in a subsequent part of this Report, there can be no harm in adding to the above remarks a few data on the general

bases which it would seem advisable to give to the organization of the superior establishments for technical instruction above mentioned. They should be copied in great part from those adopted with such success in the German and Swiss institutions of the same kind.

GENERAL SYSTEM.—DAY SCHOOL.

In all the establishments for technical education, which Departments and towns should be encouraged to found, outdoor pupils should be the general and absolute rule; payment the fundamental principle; gratuitous admission, whether total or partial, the exception.

The programme of the studies should extend, according to the particular branch over from two to four years, the studies being so graduated that by combining theoretical principles with their application, each year or couple of years should comprise a complete body of knowledge such that the pupil who had acquired it could employ it to advantage in his adopted profession. The scientific considerations of a higher order, the difficulties peculiar to each specialty should be reserved for the last years and for the most capable and most persevering students. This course of instruction would thus form, according to their intelligence and the duration of their studies, recruits for the two classes of workers required in all manufactories; foremen, overseers, surveyors, under engineers, and engineers, architects, and managers.

SCHOOL PAYMENT.

The expenses attending establishments for which towns or Departments should find premises, firing, and light, while the Government, as an encouragement, should make grants towards furniture and apparatus, would not be very great, and the payment might be fixed very low as in Germany. 200 to 300 francs a year should be the maximum.

As the day school system would allow the young people of the town to live with their parents, while strangers could obtain board and lodging at a cheap rate, their total expenditure would be confined within narrow limits. Poor and deserving students might, with the aid of exhibitions granted by their native towns, regulate their school life according to their means, without their pride being in any way offended, as is unfortunately too often the case in the Government schools.

MANAGEMENT.—DISCIPLINE.

As the establishments will owe their origin entirely to departmental, municipal, or private action, the general management, including the choice of professors, administrative supervision, internal and external discipline, would be in the hands of the local authorities.

The internal management should be confided to one of the professors named by the founders, and should be assisted by a council composed of the principal professors.

Each professor should be charged with the discipline of his own pupils as far as regards order and study, and in each technical division one of the professors should be charged with its general supervision.

EXAMINATIONS.

At the end of each school year, the passing of the pupils to the courses of the following year, should be decided either by the marks of the year, or by examinations. When the teaching is regulated as above described, so as to allow the pupils at the end of the first period of one or two years to leave the school to enter on a profession, there might be delivered to them certificates describing the studies in which they are proficient. The diploma testifying to a complete course of study should be delivered only after examinations, the programmes of which, distinct for each technical division, should be made as uniform as possible for all the schools of the same kind, in order to give the said diplomas the same value throughout the whole empire.

The results of the examinations and the classing of the pupils should be announced every year in a public meeting, when the director would also give a detailed report of the actual state and progress of the establishment. This report and an abstract of the proceedings at the public meeting should be printed, and the professors should each be requested to add a concise account of what had been done in his own class. To this should be added detailed programmes of all the courses which the council of professors may have decided on giving during the next year.

After maturely weighing all these considerations the Commission recommends:—

“ 1. That, under present circumstances, the large Government schools for superior scientific and technical education, have hitherto sufficed for the requirements of the public services and to some extent for those of industry ; but that

“ considering the general progress of manufactures, it would
 “ be desirable to found district establishments in certain
 “ localities, independent of the State, for the purpose of
 “ giving young men a superior scientific and technical
 “ education, especially suited to local wants, and which should
 “ leave the pupils under the direct superintendence of their
 “ parents.

“ 2. That the State should make grants in aid of institutions founded and conducted on these principles (29th sitting.)

“ 3. That, in district establishments of this kind founded
 “ by the local authorities or private persons, the regulations
 “ for examinations, the certificates or the diplomas to be
 “ granted after the studies should be determined by local
 “ commissions, independent of the State, and without any
 “ intervention on its part which might render it responsible.”
 (29th sitting.)

Note by the Editor.

In this country the number of institutions for teaching advanced science applied to manufactures is very limited. There are two establishments supported by Government, the School of Mines in London, and the School of Science in Dublin. Of the former of these the statistics are given in Appendix C., p. 167 of this volume. The latter has been formed by the incorporation of the educational branches of the Museum of Irish Industry and the Royal Dublin Society; it has only been a twelvemonth in existence.

The institutions dependent on private and local support are also not numerous. The scientific divisions of King's College, London, and of Owen's College, Manchester, are among those which are best known. In the English Universities of Oxford and Cambridge, and in Trinity College, Dublin, there is nothing corresponding to courses in *applied* science. The Scotch Universities and University College, London, are better endowed in this respect.

SECTION V.—COMMERCIAL EDUCATION.

GENERAL OBSERVATIONS.

ALTHOUGH technical knowledge, based on the principles of science and the rules of art, is necessary to industry for the manufacture of its products, and the spirit of invention and improvement leads daily to the discovery of new methods, instruments, and processes, which allow of more rapid and perfect production, it must nevertheless be acknowledged (and too many examples prove this,) that all the resources

of science and intelligence are insufficient to secure the success of industrial establishments, and that skilful, prudent, and experienced management are not less indispensable. All the genius of Watt would probably have failed to produce, in English manufactures, the vast revolution which has so long assured to his country, in the industry of metals and textile fabrics, a superiority against which the other nations of Europe still struggle with difficulty, if he had not found in his partner Bolton not only a capitalist, but a manager and a merchant of extended views who directed and developed their immense establishments. Thousands of ingenious inventions, improved processes, and finished machines might be cited which have only led to the ruin of their authors, not as too commonly supposed, for want of capital to carry out their designs, but owing to the want of able management and of sufficient business knowledge and experience. On the other hand, establishments are often seen to prosper in which antiquated processes, and indifferent and recondite productions would seem little calculated to secure success. But they flourish because their principals are prudent and economical managers, are thoroughly acquainted with the commercial conditions of the business, and know how to give their operations a proper direction.

Now, unfortunately, it is a fact only too evident that in France, of all the branches of study necessary for industry, the one most generally neglected is that which treats of the questions relating to commerce, whether considered in a general point of view, or with regard to details. The members of the Commission best able to give an opinion on such matters have remarked the almost total absence of this branch of instruction in our country, and the general ignorance which prevails on all matters connected with the theory of exchanges, commercial geography, &c.

The Paris Chamber of Commerce, with a view to remedying this lamentable state of things as far as lay in its power, founded in 1864, an elementary school of commerce, chiefly for the purpose of training accountants.* The remarkable success of this first establishment has suggested to the above-named enlightened and liberal body, the thought of likewise organizing a course of superior commercial instruction, intended to prepare not merely accountants and head clerks for counting houses, but to impart the special knowledge necessary for the heads of trading firms.

* Note VIII., p. 162, contains the general programme of the studies and particulars respecting the present state of this establishment.

But these useful institutions, which are a credit to the chamber that introduces them, are far from being sufficient to meet the requirements of the capital. At Lyons, Mulhouse, and even Paris, to obtain good accountants, merchants are often obliged to have recourse to Switzerland and Germany, where attention has long been paid to the preparation of youth for this special and important branch of industrial enterprise. In Germany, there are in fact a great number of commercial schools of different kinds; some annexed to the Practical Schools (*Real Schulen*), intended for young men already engaged in trade; others of a higher order, such as the Academy of Commerce at Vienna, the School of Commerce at Munich, the commercial divisions of the Polytechnic Institutes of Munich, Stuttgart, Baden, &c. The former teach only the ordinary acquirements sufficient for the lower clerks in mercantile houses, such as book-keeping, commercial arithmetic, &c., while the schools of the higher order teach commercial geography, statistics, and history, general and national mercantile law, the rules of exchange, the knowledge of raw materials and manufactured products, and also political economy. This branch of education is no less cultivated in Switzerland. There is consequently no reason to be surprised that this diffusion of commercial education, added to the knowledge of one and often two foreign languages, too much neglected in France, induces our great manufacturing and mercantile houses to go abroad for their managing clerks.

The foundation of the Superior School of Commerce through the efforts of M. Blanqui, professor of Industrial Economy at the Conservatory of Arts and Trades, originated in the desire of disseminating in France the general and special scientific acquirements which ought to be possessed by every man who intends to engage in commercial operations of any importance. Such is the object of the instruction given in this establishment, and the great number of young men it has trained, the influx of foreign pupils, and the regular order of the studies have gained for it a well merited reputation. But the Superior School of Commerce in Paris is the only institution of the kind that France can boast, and it is far from meeting all requirements.

The extension of this kind of instruction is moreover attended with considerable difficulty in France, arising from the scarcity of competent teachers. The men who have acquired the necessary experience by a long practice in business are often unsuited for teaching. The science of commerce is not expressed in a body of precepts which

form a well defined system of knowledge. The result is that the studies specified in some of our scholastic establishments, and especially the Lycées, under the name of commercial education, are far from being directed with the uniformity of principles that is desirable.

This absence of system has suggested to a member of the Commission the possibility of encouraging the establishment of a kind of normal school for training professors of commercial science. But this opinion has been set aside, not only on account of the general considerations which have deterred the Commission from recommending the organization of a body of professors for technical education, and which will be explained hereafter, but also, in the particular case of commercial teaching on the ground that of all the kinds of technical instruction that might be usefully developed in France, the branch relating to the operations of trade, so various and differing so widely in different places, is also the one which least easily admits of a normal and uniform method, though it must be subjected to general rules. Every commercial centre, every great port has its relations determined by its geographical position by the means of communication, whether by rail, canal, river, or sea, which converge to or diverge from it, the trajectory in fact in which raw materials and manufactured goods must move. The study of this constitutes the foundation of the course of commercial geography applicable to its traffic. The commercial customs and usages, the modes of exchange and of payment, the nature of the outward and homeward freights, all or nearly all are peculiar to each of these centres. They require, on the part of the professor, a profound knowledge and experience in local affairs, which could hardly be acquired in any normal school, and the absence of which would depreciate in the estimation of the practical traders of each locality, the men most deeply versed in the true principles of commercial science.

In this, as in all other branches of technical education, the professors must therefore be brought up among those who are or have been actually engaged in mercantile pursuits. They must combine matured experience and adequate scientific acquirements with a love of their profession. This would enable them to undertake the duty of teaching with the zeal which the consciousness of serving one's country always engenders in a generous mind. Like the other branches of technical studies, commercial instruction should be given in different degrees according to the proficiency and position of the pupils.

From all these considerations the Commission came to the following resolution on this important subject:—

“Notwithstanding the existence in Paris of the Superior School of Commerce, and the laudable efforts which have been made, either in Paris under the influence of the Chamber of Commerce, or at Lyons, or in any other important centres of trade, commercial education is not sufficiently developed in France. It is most desirable that this education should be more widely diffused, and that it should be constituted a special subject.

“In order to adapt it to the different social positions of the youths who devote themselves to trade, commercial education should be given in two degrees; one elementary, the other superior.

“The elementary instruction should comprise—

“Caligraphy.
 “Arithmetic.
 “Commercial geography.
 “Merchant’s accounts.
 “Bookkeeping.

“The knowledge of raw
 “materials and manufac-
 “tured products.
 “The French language.
 “Commercial correspond-
 “ence.

“The superior instruction, besides the preceding subjects, should include—

“Living languages.
 “Commercial law.
 “The principles of political
 “economy.
 “Commercial history.
 “Commercial literature and
 “correspondence.

“The comparative prices of
 “purchase, conveyance,
 “manufacture, and sale.
 “Banking, exchange, trans-
 “actions on account.
 “The custom-tariffs of
 “France and foreign
 “countries.

“It is desirable that the education which the Minister of Public Instruction proposes to organize under the title of *Secondary Special Instruction* should be directed, so far as commerce is concerned, on uniform principles, so as to enable the pupils to receive with profit the commercial instruction properly so called.

“The State ought not to found or bear the cost of any establishment especially appropriated to commercial education, but it would be well for the Government to encourage, by the means at its disposal, the establishments of that kind which Departments, towns, or private individuals should think proper to open by their own efforts. Similar encouragements should be given to the opening of even-

“ing or Sunday classes for the benefit of young men engaged in commercial occupations.” (30th sitting.)

ON THE COMMERCIAL EDUCATION OF GIRLS AND WOMEN.

The Commission, in examining the measures to be taken for diffusing commercial instruction, has not overlooked the considerable and very important share that should be allotted to women. All occupations which retain the mother near her children, which keep the young girl under the care of her mother, and by which all the members of the family derive a benefit from the work of each person composing it, produce too beneficial an influence on the general prosperity and the promotion of public morals, for the legislator not to be anxious to favour their development as far as possible. Women possess quieter and more sedentary habits; they have generally a stronger sense of duty; they pay more careful attention to what they do than men; they are therefore eminently calculated to fulfil functions which require accuracy and regularity.

For a long time past the public administrations of the Stamp Office, the Post Office, and the Tobacco Monopoly, as well as bankers and railway companies employ women as factors and clerks. A great number of mercantile houses entrust them with the bookkeeping and counting-house duties; many manufacturers and merchants have no other cashiers than their wives, and have good reason to be satisfied with that arrangement. It is by no means unusual to see important banking houses, large metallurgical and agricultural undertakings conducted by widows, whose maternal affection has developed in them the intelligence and firmness necessary to retrieve the fortunes jeopardised by losing the head of the family. These examples and many others which daily present themselves abundantly prove the importance of actively organizing commercial education for females.

Lyons, the great commercial and manufacturing city, has already constituted a course of commercial arithmetic, and has entrusted its management to a woman. The school founded by the *Society for the Professional Education of Women*, already mentioned, and which owes its existence to private efforts, makes commercial arithmetic the chief object of its studies, and those members of the Commission who visited it saw with what success the instruction was there given by a woman. Note II., p. 125, contains some particulars respecting this school, which is now kept in the Rue du Val-

Sainte-Cathérine, and has already one branch in the Rue Rochechouart. The rapid development of these institutions founded by private persons shows the great usefulness and probable success of similar establishments when properly managed. As the limits within which the instruction must in the present case be confined are naturally restricted, there would be no difficulty in finding teachers of either sex sufficiently experienced for the purpose.

Persuaded of the usefulness of such instruction the Commission has expressed the following opinion:—

“The organization of commercial education for girls and women, judiciously adapted to their sex, merits most particularly the encouragement of the State.” (30th sitting.)

Note by the Editor.

There are in England no opportunities of obtaining special instruction in commercial science. The commercial schools, as they are called, are private schools intended for the training of the children of petty tradesmen, and the education given is not above, or even equal to, that of the schools under Government inspection. Indeed the Education Commission will report that there is absolutely nothing worthy of the name of education between the national and the grammar schools.

The Society of Arts have established a system of examinations, with certificates and prizes, to stimulate instruction in special subjects among the lower middle and working classes. In their programme are included arithmetic, book-keeping, geography, economic botany, modern languages, and political economy, all recommended by the French Commission as subjects of instruction in commercial education. But the action of the Society of Arts does not seem to promote any regular and well-defined system of commercial education properly so called; it rewards the taught, but makes no provision for the teacher.

SECTION VI.—SUPERIOR PUBLIC INSTRUCTION OF THE APPLIED SCIENCES.

GENERAL REMARKS.

The only public establishment in France, and even in Europe, where public instruction in the sciences applied to industry is given gratuitously is well known to be the Imperial Conservatory of Arts and Trades (*Conservatoire Impérial des Arts et Métiers*). Here have been established fourteen courses, comprising geometry applied to the arts, descriptive geometry, mechanics applied to the arts, civil architecture, physics applied to the arts, chemistry applied to

the arts, agricultural chemistry, agriculture, agricultural works and rural engineering, spinning and weaving, dyeing, calendering, and printing of textile fabrics, political economy, industrial and statistical economy. Professors equally versed in the principles of the sciences and in the conditions of their different applications keep their audiences fully acquainted with all the new discoveries that concern industry. The method of explanation generally followed in the teaching at the Conservatory, which is simple in form, free from all scientific difficulties, and always submitted to the test of experience, may be regarded as the general type which ought to be adopted for all technical instruction. This argument leads to the conclusion that the courses of the Conservatory, if their programmes were arranged in more regular order, would constitute a useful preparation for persons who wish to engage in technical teaching.

But the fact must not be overlooked that the Conservatory, in addition to its mission of expounding the principles of the sciences and their general application to industry has likewise to make known the improvements and new processes which are being incessantly introduced. Its teaching is essentially progressive, and must therefore remain completely unfettered in all its branches. It must preserve, in this respect, the same latitude as that of the College of France (*Collège de France*), and the Museum of Natural History (*Muséum d'Histoire Naturelle*), it must not adopt the periodical and uniform progression of the courses given by the faculty of sciences of the University. On the other hand, the extent of the subjects crammed into one course is so vast that the professor can only get through the whole cycle in several years. It is very rare that this period is not, for each course, three years at least, and for some, that of mechanics, for instance, the limit of five years is found barely sufficient.

Therefore, although it might be useful for persons who should wish subsequently to undertake certain special branches of technical instruction, to follow the courses of the Conservatory, not only for the acquirement of scientific knowledge, but also to learn the best mode of teaching, the Commission has expressed the following opinion:—

“It does not appear advisable with this view, to alter
 “even partially, the free action of the Conservatory of Arts
 “and Trades.” (30th sitting.)

ON THE MEANS OF PROCURING PROFESSORS OF TECHNICAL INSTRUCTION.

As already remarked with regard to commercial education one of the greatest obstacles which the development of technical education has encountered and may still encounter, is the want of professors combining all the necessary qualifications—a thorough mastery of the principles of the science to be taught, the talent of explaining them in a simple and lucid manner so as to be easily understood by the audience, a perfect acquaintance with their applications and the ability to demonstrate and practise them. Such are the general conditions, and they require a special aptitude not often found even among the men best educated and most experienced in superior instruction. The consequence is that the embarrassment of local authorities and private societies desirous of founding such courses of instruction is often extreme, and any measure which could guide them in their choice will greatly promote the success of their efforts.

With this view it has been proposed to institute professional examinations, at which persons intending to devote themselves to any special branch of teaching might present themselves to have their capabilities tested by a board named *ad hoc*, and receive a certificate declaring their fitness as teachers. The latitude which ought to be left to the founders of educational institutions of this kind has not permitted any one to think of making this certificate obligatory, and it has been regarded only as a means well adapted to enlighten them in their choice.

Practical aptitude, technical knowledge, a thorough acquaintance with business details and workshops constitute, in most cases, the fundamental conditions to be fulfilled. The examination to be undergone would not be limited to the mere proofs of theoretical knowledge; it would include an inquiry into the experience and methods of teaching of the candidate and would be always completed by a lesson on the particular subjects to be taught. Detailed programmes of the subjects of examination, and of the practical exercises to be executed for each course of lectures, would be published beforehand that candidates might know how to prepare themselves.

Ever since 1849, the appointment of the professors of Schools of Arts and Trades has been successfully made after examinations of this description, with the difference, however, that as there was a vacant chair to be filled in each

instance, a competition was opened between the different candidates. It is even remarkable that in these competitions, those who pass the ordeal most satisfactorily are nearly always ex-pupils of the schools. The experience which they have gained in the workshops and their skill in drawing are not their only distinctive qualities. Many of them speak, and explain their ideas and demonstrations, with a clearness scarcely to be expected in young men whose early education has not unfrequently been much neglected. The competitions for the professorships in the Schools of Arts and Trades are generally held at the Conservatory, where the rich collection of models and the laboratories offer all the appliances necessary for the examination, and most of the board of examination are taken from its professorial staff or from the Council of Improvement (*Conseil de perfectionnement*). This council consists, in conformity with the Decree of 10th December 1853, of from 24 to 26 members, and comprises besides the professors (some of whom also belong to the Central School), the principals of large manufactories, engineering workshops, and commercial houses, as well as engineers belonging to the public services. It therefore offers, for those examinations which relate to the superior branches of technical instruction, a valuable co-operation, which, from its high reputation, must command public confidence. The Central School of Arts and Manufactures, from among its staff of professors and the body of its old pupils, will likewise supply eminently competent men as members of the examination board.

It would, therefore, always be easy for the minister to determine the composition of the board which should be charged with ascertaining the capacity of the candidates presenting themselves for examination in any kind of technical teaching. The obtaining of these certificates of aptitude being in no wise compulsory and not constituting any title, the granting of them would not in any way restrict the choice of the founders of any kind of technical instruction, nor deter from taking part in such teaching, those persons whom, in each locality, public notoriety, their own inclination, or zeal might call to the work. It is well to add that, without wishing to influence in any way the régime which the founders may wish to adopt in the teaching of each institution, the preparation of programmes carefully studied and gradually improved by past experience might, nevertheless, be very useful in making known the best methods to be adopted, according to the nature of the courses and the composition of the audience, as well as in introducing into this

class of studies the uniformity of teaching of which, notwithstanding their variety, they are capable.

These considerations determined the Commission to express the following opinion:—

“It would be useful to open voluntary examinations intended to certify the fitness for technical teaching of all such persons as should present themselves for that purpose. The programmes of the practical and oral tests, and, if necessary, the conditions of probation, should be determined by the minister, with the advice of the Superior Council, of which particulars will be given further on. The examinations would take place in the localities selected for the purpose before a special board named by the minister. The certificates of aptitude would be signed by the minister. The obtaining of these certificates would not be a necessary qualification for exercising this kind of professorship.”

THE FORMATION OF ESTABLISHMENTS ANALOGOUS TO THE CONSERVATORY OF ARTS AND TRADES.

As the constantly increasing success of the teaching at the Conservatory of Arts and Trades, and the extension it has received, prove the value of such an institution, in making known discoveries and improvements in manufactures, and at the same time in teaching the principles of science, it is natural to inquire whether similar institutions, more particularly adapted to the wants of local industry, might not render services of the same kind. The great centres of population, industry, and commerce now contain so many enlightened men, equally versed in the culture of the sciences and in the practice of the arts, that if a healthy and legitimate emulation between these seats of knowledge and Paris could be established there can be no doubt that it would have beneficial results in diffusing information and promoting the love of science. Without aspiring to possess complete collections of models, and even confining themselves to the principal types of each kind, such institutions might at least procure those of the principal machines which bear immediately on local manufactures. National and local exhibitions which are now constantly on the increase would offer favourable opportunities for making additions, sometimes at little expense, to such collections.

The city of Lyons, among the popular institutions founded by the enlightened patriotism of its inhabitants, possesses a museum of machines, more especially composed of those

employed in its manufactures, and a splendid collection of patterns of textile fabrics admirably classified. Amiens has formed for its district a very varied collection of cloth and stocking looms.

But what would be at least as useful as collections of models, is the erection of chemical laboratories, where young men who had attended the courses professed in that science and its applications might familiarize themselves with its operations and practise manipulation. In all the technical institutions of Germany the chemistry divisions have at their disposal extensive and well arranged laboratories, which can accommodate, some from 40 to 50 pupils; some, as that of Zürich, as many as 100. Similar means of instruction established at Lyons, Marseilles, Rouen, Lille, Mulhouse, in short, wherever the chemical arts are applied to manufacturing processes, would be of immense value.

Determined by these considerations, the Commission concludes:—

“ That local efforts for the formation of public courses of
 “ lectures on the applied sciences, and of technical museums,
 “ like those of the Conservatory of Arts and Trades, specially
 “ adapted to the manufactures of the district, and provided
 “ with chemical laboratories, where a certain number of
 “ pupils might be exercised in manipulation, deserve to be
 “ encouraged.” (33rd sitting.)

LIBRARIES.

The Minister of Commerce has always, within the limits of the resources placed at his disposal, contributed in enriching the public libraries with works that might be serviceable for promoting the progress of industry. But there is one particular kind of library whose foundation and development it is important to encourage. They are those which are formed and maintained by the action of private societies and working men's clubs (like those at Guebwiller), or those which have been established by means of municipal subventions or private donations in certain schools connected with manufactories. All of them demand a moderate payment from the persons who use them. On this subject the Commission reports that:—

“ A good selection of works on history, geography, and
 “ philosophy, and those which treat of questions of art,
 “ manufactures, and science; a facility of frequenting the
 “ reading-rooms, and especially that of borrowing the books
 “ to read at home, are effective means for diffusing the

“ taste and habit of useful reading. The formation of
 “ popular libraries deserves the hearty encouragement of the
 “ Government.”

Note by the Editor.

We have in the United Kingdom no institution exactly analogous to the Conservatory at Paris. A somewhat similar establishment might be formed by combining the technological portions of the South Kensington Museum with the educational courses given by the professors of the Royal School of Mines to working men. The evening courses at the Andersonian University of Glasgow, and at the Watt School of Arts at Edinburgh, correspond in some degree to the gratuitous instruction professed at the Conservatory.

In respect to libraries, the passing of the Free Libraries Act has placed us in advance of the French. It is perhaps not generally known that a portion of any building erected and supported by local rates, according to this Act of Parliament, may be devoted to instruction in science and art. In the towns of Cardiff, Gloucester, Liverpool, and Northampton science classes have been established in connexion with the free libraries under this particular clause of the Act.

SECTION VII.—TEACHING OF DRAWING.

OBSERVATIONS ON TEACHING DRAWING.

DRAWING is, in all branches of industrial art, a means so evident, so useful, and so indispensable for embodying the conceptions of the mind, for studying and fixing the forms to be given to productions, for rendering the creative idea, that there can be no need of insisting on the necessity of developing that branch of instruction which has for its object the diffusion of such an acquirement among artizans of every class. This necessity, which has long been deeply felt in France, has led to the multiplication, in the great industrial centres, of schools for art and scientific drawing, which, while offering to the national taste the means of manifesting itself, have hitherto secured to French industry a great superiority in a large portion of its manufactures.

The Universal Exhibition of 1855, and especially that of London in 1862, have clearly shown the results which England has already obtained from the immense efforts—among others the establishment of the splendid museum at Kensington,—she has made, ever since 1852, to deprive France of that superiority in the works of industrial art which the first exhibition of 1852 had proved to be indisputable. Soon after this exhibition, the most competent judges in England, far from refusing to acknowledge the

pre-eminence of our artists over theirs, publicly proclaimed it, and with the promptitude and active energy peculiar to their nation, they set about diffusing through all classes of society a taste for drawing and the arts, not only among working men and artists, but also among the general public.

The English Government, abandoning its principle of non-intervention in home administration, decided at this period on taking up the general organization of art education, and formed, in the Privy Council, a new section under the name of *Science and Art Department*, especially charged with propagating the study of drawing.

The institutions dependent on the *Science and Art Department* are divided into two categories.*

“1. *Public teaching*: Schools of Art and local associations of primary schools for teaching drawing;—annual inspections of the local schools and primary schools combined in associations;—annual local competitions;—central museum at Kensington;—loans of models and books on art from the museum to local schools;—exhibition in the localities of the articles thus lent;—pecuniary grants to the local schools for purchasing models, and, in certain cases, towards the expense of first establishment.

“2. *Training of Art Masters*: Examinations of fitness, and graduated certificates;—free admission of exhibitors from the schools of art, and of pupil-teachers intended to become art-masters;—normal school of art;—certificates of fitness to teach elementary drawing, given upon examination to primary school-teachers of either sex.”

Notwithstanding this organization, which would seem to indicate that the *Art Department* has become a sort of university for teaching drawing, acting like the French university for literature and science, the action of the Department is limited to encouraging local or private foundations, to directing their efforts, to preparing and training capable teachers, and to indicating by general programmes the proper course to be followed.

The summary programme of the central schools of drawing is as follows:—

“1. *Elementary course*: Geometrical drawing,—linear perspective,—free-hand drawing with shading,—drawing from relief,—figure drawing from lithographed or engraved models,—principles of water-colour drawing.”

* Extract from the Report by MM. Marguerin and Mothéré, already quoted.

“ 2. *Superior course*: Drawing from relief,—painting,—ornaments,—flowers,—still life,—landscape.

“ 3. *Special or technical course*: Art anatomy,—elementary composition,—designing,—modelling,—architectural and machine drawing.”

MM. Marguérin and Mothéré's remarkable report, from which we have copied the above, contains very complete information respecting all this organization, which in 1861 taught drawing to 91,836 pupils, more or less advanced.

Everybody knows the magnificent Art Museum at South Kensington, for the founding of which the *Science and Art Department* has collected from all quarters master-pieces of every kind, at a total expense to the State of not less than a million sterling since 1852. Besides this outlay for first establishment, the *Art Department* has a yearly grant of 80,000*l.* sterling.

By the extent of the resources placed at the disposal of this special and new department, created for the purpose of enabling English industry to compete with ours, an opinion may be formed of the importance rightly attributed in England to the participation of the art of design in all industrial productions, and no surprise can be felt that such efforts have called attention in France to the necessity of maintaining among ourselves that superiority against which the foreigner sought to struggle by giving a greater development to the teaching of drawing. As far back as 1852, almost immediately after the London Exhibition, the industrial artists of Paris presented to the Prince President of the Republic several memorials, in which, after alluding to the efforts already made and to others meditated by the English, they urgently recommended :

1. The organization of a special exhibition for the works of industrial artists ;

2. The creation of a museum of industrial fine art ;

3. The establishment of a central school of fine arts applied to industry.

They suggested at the same time that these three formations should be included in the programme of the Conservatory of Arts and Trades.

England is not the only rival of French industry which has recognized its superiority with regard to works which require the aid of art and taste. Germany, moved by the same sentiment, has organized, since 1852, at less cost, but perhaps with as much success, drawing schools of different degrees. In all the Practical Schools and in the Polytechnic Institutions, the teaching of drawing holds a prominent place,

and almost everywhere the method which had been systematically organized by the late M. Dupuis is successfully followed—a method which consists in habituating the pupil as soon as he can well hold a pencil, to draw from models in relief or natural objects.

The drawing school which is justly regarded as the best in central Germany is that of Nüremberg, the director of which has laid down the principle that, to become a skilful industrial artist, it is indispensable first to study art in all its varieties. Under his energetic supervision a great number of professors and artists have been trained, who have disseminated good methods, and have brought about in the productions of industry, especially in those of Nüremberg, a most remarkable artistic improvement.

In the kingdom of Würtemberg, the Department of Commerce and Industry has organized in nearly every town classes for drawing, modelling, and sculpture in wood and stone. These are often conducted by workmen who have become sufficiently skillful, and who, without abandoning their profession, undertake the duties of teachers in the evening. Annual exhibitions of the drawings executed by the pupils are held at Stuttgart, when rewards and prizes are awarded to the pupils and masters who present the best works.

Besides the study of artistic drawing, properly so called, that of linear drawing based on geometrical principles has also been widely extended in Germany. Descriptive geometry is taught elementarily and with entirely practical applications, in the drawing classes opened for artizans; there they also acquire the theory of projections.

Collections of technical drawings relating to the working details of the more important manufactures, and generally executed in a very good style, were communicated to the members of the Commission who visited Germany, and may be consulted with profit by those who undertake to organize classes of the same kind for young workmen.

All these efforts made by countries, who are our rivals in industry, must not be overlooked by us, and however great our confidence in the superiority of the national taste, it is desirable to keep a watchful eye on the progress made abroad. The impression which this progress has made on some few enlightened friends of our industrial arts is very strong, and fears, perhaps a little exaggerated, have been expressed, that France may be in danger of losing the lead in matters of taste. On this subject, one of the members of the Commission, most competent to form an opinion on the gradual,

continuous, and ever ascending progress of industrial art in France, has given convincing information. He asserts that this superiority is constantly maintained to the same extent, and that if our public exhibitions occasionally display productions of doubtful taste, such a circumstance does not show, on the part of our manufacturers, any contempt for the rules of art, but is simply the result of concessions made to meet the necessities of trade. Nevertheless, though this information justifies us in retaining, in spite of the progress made by foreign rivals, full confidence in the superior taste of our artists, and of the public in midst of whom they live and often find their inspirations, it is still necessary to take into account the considerable development which, since the late universal exhibitions, the teaching of drawing has received abroad, especially in England and Germany.

Independently of the question of taste and art, which is of such vital importance for a great number of the higher branches of French industry, there is also a necessity, as many of the members of the Commission have remarked, for introducing first into the primary schools, then into the technical classes of all kinds, the teaching and practice of geometrical drawing. This subject presents for the instruction of artizans, the two-fold advantage of giving the exact representation of the forms and proportions of objects, and the not less important one of supplying, with the aid of models and simple apparatus, in a great number of cases, a direct means of demonstration. From this point of view the teaching of geometrical drawing may be considered as a most effective auxiliary means in the method adopted for the technical instruction of workmen. Convinced of this truth, the Commission expressed the following opinion :—

“ The Commission attaches great importance to extending
 “ the teaching of geometrical drawing, as well in primary
 “ schools as in establishments devoted to technical in-
 “ struction. It regards geometrical drawing as a most useful
 “ training for the practice of various trades and as an ex-
 “ cellent means of direct demonstration.” (34th sitting.)

Schools and Museums of Industrial Art.

If the teaching of the art of drawing considered as a whole and with its principal varieties, should be regarded from a generally elevated point of view, even when the sole object is its application to the works of industry, it is advisable that the pupils should successively cultivate the higher branches, the human figure, architecture, ornament, modelling, and sculpture on wood and stone, so that one and the same composition or

subject may be conceived, treated, and executed by the same artist. To provide against the principal idea of a work being either weakened or entirely lost, the artist should be so far instructed in the different branches as not to be obliged, as some historical painters have been in times past, to get the architecture of their buildings drawn by one assistant, the landscape by a second, and sometimes the horses by a third. The history of the art and of the styles which have prevailed and characterize the productions of different epochs ought also to be the object of serious study, so that the artist may not be in danger of jumbling together in the same production the forms and ornaments belonging to very different periods and styles, as was the case with many of the English exhibitors in 1862. On this account, the demand for the founding of a superior school of industrial art, made in 1850 by the leading Parisian artists, appears to be well founded.

But this school could not be efficient without a museum containing the most perfect types and models of art applied to industry at different epochs, the creation of which, in Paris, was likewise demanded by the same artists. Such a museum accompanied by a library and a portfolio of industrial art-designs, might, like that in the Louvre, be open for students. It would of itself constitute a studio where artists already advanced might go to inspect models from which they might borrow details, forms, and examples, calculated to extend and perpetuate good taste in the products of industry. A project for the establishment of a museum of this kind at the Conservatory of Arts and Trades was drawn up, presented in 1850, and twice approved by the Emperor. If this project were carried into full execution the drawing school of this institution, founded at a moment when scarcely any existed in Paris, (although it now has not even the importance of several municipal schools,) might, at little expense, and without any very great additions, be transformed into a superior school for drawing applied to industry. It would receive the most distinguished pupils of the principal schools in Paris and throughout the Empire, who would there improve their talents, and thus form a nursery of professors fitted to disseminate in the provinces the best modes of teaching the traditions of genuine art and the rules of taste. Thus would be realized the thought expressed in 1809 by Napoleon I., who, perceiving all the value of the art of drawing, wished to extend this school so as to allow it to receive 500 pupils.

On the other hand, the fact is evident that each of the industries which has recourse to art, to ornament or embellish

its productions, imposes on it special conditions of execution. The manufacture of figured and printed fabrics of every kind, of castings in bronze, iron, &c., sculpture in wood and stone, pottery, painting on glass, porcelain and enamel, &c., all these industries subject the designer, decorator, modeller, or sculptor, to necessities which can only be properly appreciated and met by those who have a practical acquaintance with the workshop. It is therefore almost impossible to expect that a normal school of art applied to industry can enter upon an examination of all these various necessities. To local schools, founded by private effort, must be left the duty of providing for each industry the peculiar technical instruction required, as well as that of founding the museums and collections of models which may be considered indispensable.

From all these considerations the Commission, without giving an opinion on the projected development to be given to the drawing school at the Conservatory of Arts and Trades, has come to the following conclusion:—

“The Commission thinks that the creation by the State of a Central Museum of Industrial Art would be beneficial, but, believes that, for the founding of special schools of art applied to industry, it is advisable to leave all action to local and private effort, while offering it every encouragement.” (34th sitting.)

Note by the Editor.

There does not appear to be anything to add to the account given by the French Commission in this section of the institutions for learning drawing and the Museum of Industrial Art in England; it seems from the report that, as far as means for art instruction are concerned, we are in advance of the French. A list of the Schools of Art now in existence is given in Appendix E., page 174.

It may be remarked, however, that in instruction in linear and machine drawing we are much behind the countries of the Continent. It is not unusual to find in the drawing offices of our great machine works foreign draughtsmen. One of the reasons for this no doubt is the smaller rate of wages at which they can be obtained, but it seems also that the special instruction they have received in really scientific drawing gives them great advantage over the English draughtsman, who has studied his art only by rule of thumb. A reference to the table of the attendance at the Government science classes in Appendix B., page 166, will show that since the year 1864 the number of students attending the three drawing subjects—practical and descriptive geometry, machine construction and drawing, and building construction and drawing—has steadily and considerably increased. When practically and scientifically taught, the subject of descriptive geometry takes the place of mathematics in the technical training of those who, from their limited elementary education, cannot appreciate the value of rigid mathematical proof, nor comprehend the use of formulæ.

SECTION VIII.—INTERVENTION OF THE STATE.

IN the discussions on the different educational establishments, intended to diffuse among working men of all ranks the technical scientific knowledge necessary for them, the Commission has not lost sight of the very important question of the influence which the State can and ought to exercise, but has made it an object of special study, examining it under the two following heads :

1. Ought the State to create a special organization for technical instruction, in its various degrees, so as to secure one uniform method to the studies in all places ?

2. Ought the State to limit its action to encouraging the attempts made by Departments, cities, townships, commercial firms, charitable and philanthropic associations, and private individuals, by coming to their aid in proportion to their wants, resources and efforts ?

The following considerations on the essential difference existing between general and technical education, have determined the resolution adopted by the Commission.

The literary and purely scientific instruction given by the State in all the degrees adapted to the general wants of society being necessarily regulated on uniform bases, according to the plan and the methods which experience has sanctioned, it can be confided only to one general management, which is and must be that of the Ministry of Public Instruction. The latitude left by the laws on public instruction to private schoolmasters, in every respect, has not led them to deviate to any considerable extent, in an educational point of view, from those methods whose uniformity is to a certain extent dictated by the nature of the studies and the knowledge to be acquired. It must, moreover, be noticed that the general education which takes the child on his leaving the elementary school to conduct him gradually, and in accordance with his intended career, to the study of the classics, and that of the theoretical elements of the sciences, is for the benefit of a particular class of scholars, both prepared and fitted to receive it. This instruction when wisely graduated and regulated, may be beneficially diffused in a nearly uniform manner, without any other inconvenience than that of leaving behind the less industrious and less intelligent pupils. The sacerdotal character (*l'organisation hiérarchique*) of public instruction moreover requires that all the teachers should be themselves trained and prepared to follow, without deviation, certain fixed methods and normal rules, in order

that a change of instructors may not cause any confusion in the course of study.

But this system cannot be adopted in the instruction of apprentices, workmen, and artizans of all classes, and in imparting to them the theoretical and practical knowledge required for the enlightened exercise of their various trades. There, the capacities of pupils are as different as the subjects to be taught are various and even the general knowledge, which must be common to every one, cannot be taught to all in the same manner. Though the object to be attained is always the same—that of elevating and instructing the human mind—the light that must and can be brought to bear upon it cannot have the same intensity or be imparted by the same means. The mode of teaching must vary from one class of pupils to another, like the industries and the localities where it is practised; it must be limited to the principal great divisions under which its applications may be comprised.

Even arithmetic and elementary geometry, for instance, must not be taught by the same method to children and apprentices, whose intelligence is more flexible, more mouldable, if the expression may be allowed, as to adults and workmen, whom the toils of the day have not prepared for mental effort. To succeed in the theoretical part of such teaching, professors must be able to adapt their explanations and their reasonings, to the audience they address, and must use every available means to drive them into the mind, even resigning themselves at times to sacrifice strictness of demonstration to the necessity of making themselves understood. Thus arithmetic, for instance, and especially geometry, may, and must often be taught by the eye and by the touch, as much as by reasoning, and it is chiefly from this point of view that the study and practice of drawing are indispensable auxiliaries in every method of teaching the sciences in their application to industry. These studies, intended for practical purposes, cannot therefore be efficiently directed with all the befitting details of execution, with the explanation of processes, and the necessary experiments, except by men who have, themselves, practised the arts whose principles and rules they have to explain, and who know how to speak the language of the shipyard and the workshop. Hence results the impossibility of establishing for professional or industrial teaching, even from a general point of view, a uniform body of rules and methods, an organized professional staff, in short, a university of industrial education. This consequence is still more evident in all that concerns those technical studies,

which have for their immediate object the methods, rules, and application of the sciences.

It is, therefore, often on the very spot where the technical instruction is to be given, or in the workshop itself, that many of the professors ought to be chosen; and in general they must be sought among engineers, practical men, and manufacturers. The duty of selecting them with its responsibilities must be left to the local councils, and the societies which may have undertaken the task of founding these educational establishments. The office of teacher having been thus constituted, without making a caste (*carrière hiérarchique*) of it, and considering it always as more or less temporary, and to be resigned in case of failure, it will always be easy to repair the consequences of an unfortunate choice, and the teachers will only be the more interested in securing success. This plan, however, cannot be made absolute, nor altogether general. As regards teaching of a high order, it will often be to the interest of the establishments and to the dignity of science, to give a more assured position to the professors engaged.

To the reasons drawn from the very nature of the teaching, (which it is intended not to found, but to develop and organize better than has hitherto been done,) which reasons reject the notion of creating or employing any special body of professors, may be added, some of another order which lead to the same conclusion. The first is economy of the public money, the dispensers of which would rightly refuse to satisfy wants which are rather local than general, and ought therefore, in all reason, to be met by the cities or Departments where they arise. Manufactories are most numerous in the provinces; country towns and districts will therefore be the first to profit by the new system and may be fairly called upon to bear a large proportion of the outlay. It must not be forgotten, that the University cannot, for reasons too evident to require repeating, be charged with the direction of this system of instruction. But in certain branches, and especially in physical and chemical science, it would often be possible to find among its professors men capable of accommodating their teaching to the special requirements of their audience, and sufficiently devoted to the duties with which they were charged to undertake the practical studies required of them. On the other hand, the civil and military engineers of the Government, the profession generally, and well-educated manufacturers will often consent, as they have done already, to undertake certain branches of this instruction. Such men will combine a knowledge of the

principles of science with the moral authority belonging to practical experience.

It must, however, be acknowledged that though the natural consequence of the preceding considerations is to allow the founders of technical schools of every kind all necessary latitude, and almost entire liberty in the management of their own institutions, it would not be possible to leave these establishments altogether to themselves without aiding them to a certain extent. The habits of our nation are not those of a neighbouring country. The political usages of England have led to the practice of *self-government* in almost everything, and it is most desirable that similar habits should be introduced and generalized in France, but prudence requires that the change should be effected by gradual means. Already well-timed and laudable examples of the independent and free action of local initiative have been furnished by Mulhouse, Lyons, Amiens, Nantes, and other cities. Such a movement cannot be too much encouraged, as it may bring about, without any sudden change, the intellectual decentralization of the country, by promoting the formation of numerous centres of study and scientific activity. But it is nevertheless true that in the actual state of our customs and habits, the intervention of the State in the way of encouragement and assistance of various kinds will still be necessary for a long time. And this intervention will be to the Government a powerful means of stimulating and exciting local and individual undertakings to make efforts of sufficient importance to entitle them to share in the State assistance. It may even frequently happen, and it is most desirable, that after a certain time, when the institutions founded have been well directed, and success has crowned their efforts the State, perceiving that its pecuniary or material assistance is no longer necessary, may withdraw it, and give only honorary encouragement, and that the founders themselves may prefer independence to a protection which, however well-meant, is always burdensome.

Convinced by these arguments, the Commission has adopted the following resolution:—

“ The Commission thinks that it would be well to adopt,
 “ for technical education in its various degrees, a general
 “ organization in order to secure a uniform tendency and
 “ direction. It believes that while retaining the manage-
 “ ment of the establishments of this kind which are already
 “ under its immediate direction, the future action of the
 “ State should be limited to encouraging the attempts made

“ by Departments, cities, townships, chambers of commerce,
 “ industrial companies, charitable or philanthropic associations,
 “ and private individuals, by aiding them according to their
 “ needs, their resources, their efforts, and the efficiency
 “ of their institutions.” (23rd sitting.)

As stated above, the natural consequence of the preceding principle, admitted by the Commission, is to leave to local and private efforts almost unlimited latitude for the formation and direction of the institutions they may have founded, with the sole reserve that where the co-operation of the State may have been obtained, the latter should not abandon the natural right of control which results from it.

On this subject the Commission has come to the following conclusion :

“ Full liberty of determining the kind of educational establishments to be created for the organization of the
 “ courses, classes, and workshops, and of selecting professors
 “ and methods of instruction, should be left to local or individual efforts, only stipulating that the general laws of
 “ public order shall be observed. However, in all cases
 “ where the assistance of the State shall have been obtained, it will have the right to lay down the conditions
 “ which should appear necessary to secure the proper employment of its aid, as well as the success of the establishment.” (23rd sitting.)

While thus leaving to the founders of technical instruction of all kinds complete latitude as to the direction to be given to that instruction and the choice of the teaching staff, it will still be most important for the success of the common efforts, that general instructions and publications should be issued by the Ministry of Agriculture, Commerce, and Public Works, to indicate, simply in the way of advice the methods and programmes suitable for adoption.

TEACHING OF INDUSTRIAL DRAWING.

Without in any way interfering with the liberty of action which has just been admitted in principle, there is however one branch of instruction over which it is important that a more marked control should be exerted,—it is that of drawing. Besides the fact that the number of skilful teachers of this art is still unfortunately somewhat limited, and that the methods followed are as various as the schools, it is evident that in whatever concerns constructions in masonry, in wood or in iron, the forms and machines to be reproduced are or ought to be the same, and that it is

very desirable that those which are the most preferable should be everywhere taught. For the construction of machines, this uniformity is especially desirable, for their right proportions are of very great importance. This more special interference with the teaching of drawing will be the more readily accepted without being regarded as a restriction, if the pecuniary assistance of the State should partly consist in grants of models of various kinds, productions of art, scientific and industrial works, either gratuitous, or, rather, at half price. On this head the Commission makes the following recommendation:—

“ In order to make general the employment of the best
 “ methods for teaching drawing, one of the useful modes of
 “ encouragement which might be employed by the State
 “ would consist in the granting at reduced prices, or, at
 “ times, gratuitously, of models chosen among the best
 “ types of each kind.” (23rd sitting.)

GENERAL CONDITIONS TO WHICH THE OPENING OF ESTABLISHMENTS FOR TECHNICAL INSTRUCTION SHOULD BE SUBJECT.

While adopting the principle of as broad a liberty of action as possible for the educational establishments which it is proposed to multiply, the Commission had to keep in view the general conditions which it is important that founders should be required to satisfy in the interest of morality and of public order. The Commission had also to be careful lest, by an abuse of the connexion necessarily existing between technical and general instruction, it should sometimes be sought to give the latter under the title of the former, and, for this purpose, to elude the conditions imposed by the law of 1850 on secondary instruction. But on the other hand, the elements of the sciences being indispensable for technical studies, and requiring to be, as already stated, explained by methods more direct and better adapted to the intelligence of the pupils than those employed in general instruction, the Commission thought that any condition requiring a diploma or a certificate, either from the directors or from the teachers, would be inadmissible, and that under the title of *technical instruction* ought to be included the teaching of the scientific knowledge necessary to its progress. Detailed programmes, if strictly followed, are the best means of estimating the value of such instruction, and as there is no difficulty in bringing them to the notice of the authorities, it will always be easy to ascertain

whether the limits indicated by its special character have been observed. Lastly, as it is very desirable that those establishments which are the most completely devoted to the imparting of true technical instruction should not neglect to join to it those portions of general instruction which the pupils, according to their position, ought to possess, it is right that the masters engaged to impart general instruction, properly so called,—but those only,—should be obliged to comply with the prescriptions of the Law of 1850.

It was in this spirit that the Commission adopted the following resolutions, which apply also to every description of technical instruction; to schools for children and apprentices, as well as to lectures and classes for adults.

“ Technical instruction comprises not only the exhibition
“ of the applications of science to industry and the practice
“ of the processes employed in the arts, but also the demon-
“ strations of elementary principles and the scientific know-
“ ledge connected with it.

“ Every French subject who has attained his majority may
“ create and carry on an establishment for technical instruc-
“ tion of various kinds, without preliminary proof of capacity.
“ However, if he wishes to add to this technical instruc-
“ tion those subjects which form the object of general
“ instruction, he must fulfil, either personally or through
“ the masters to whom he intrusts such branches, the con-
“ ditions imposed by the laws and the regulations on public
“ instruction.” (24th sitting.)

“ It is evident likewise that the disabilities incurred by
“ Article 26 of the Law of 1850 should be maintained.”

Formalities to be observed.

Establishments of the kind under consideration cannot be allowed to evade the laws for preserving general order, which, at the same time that they are not burdensome, are a public necessity. Of this number is the obligation of giving notice of the opening of an educational institute to the authorities, in order that they may see, so far as concerns them, to the execution of the laws. It was with this view that, without in any way restricting the right recognized in the preceding deliberation, the Commission admitted, in regard to such declaration, the following provisions:—

“ Any person wishing to open a technical school must
“ declare his intention beforehand to the Mayor of the
“ Commune in which he intends establishing himself; he
“ must give the address of his institution, and state the
“ subjects of the instruction he purposes giving. This

“ declaration must also be forwarded by the applicant to the Prefect of the Department.

“ If no opposition be notified by the Prefect, within a period of one month from the date of the declaration, the technical school may be opened.” (24th sitting.)

“ In case of opposition the applicant has the right of appealing to the Minister, and, if the decision of the latter be not made known within two months from the delivery of the notice of opposition, the establishment may be opened.”

In-door Pupils.

The Commission did not feel called on to fix any limit of age for the persons who might wish to give courses of instruction intended for out-door pupils. With respect, however, to schools receiving in-door pupils, the Commission thought that, as a guarantee for the parents and for public morality, the age of the principal should not be less than 25, and it adopted a resolution to this effect, but without adding any condition respecting the length of previous professional practice. As the supervision of such boarding schools, in which the principal has to fulfil some of the duties of the father, cannot be allowed to exempt him from the control of the authorities, it appeared necessary to draw up special regulations on this subject.

These considerations led the Commission to the following resolutions concerning establishments intended to admit in-door pupils:—

“ French subjects who may wish to establish boarding-schools intended for technical instruction must be at least 25 years of age. They will not be required to produce proof of previous training. The declarations that they will have to make to the Mayor and to the Prefect shall be accompanied by a programme of the instruction intended, and a plan of the premises.

“ Objection to the opening of a boarding school may be made by the Prefect within the period of one month, and for the causes stated in Article 64 of the Law of the 1st of March 1850, the right of appeal to the Minister being reserved. If the decision of the Minister be not made known within two months from the date of the appeal, the establishment may be opened.” (25th sitting.)

“ All the measures to be taken in the interest of the morals and the health of the pupils shall be prescribed by a body of regulations; these shall be fixed by the Prefect, at the instance of the founders, and with the advice of the Municipal Council and the Chamber of Commerce, the right of appeal to the Minister being reserved.”

Jurisdiction.

As the execution of the regulations can only be secured by the appointment of magistrates charged to watch over it, and empowered, in cases of need, to adjudge penalties for the prevention of infractions and disorders, the Commission had to inquire to what authorities this care and power might best be confided. The development, so much to be desired, of institutions for technical instruction does not in its present state permit, and doubtless for a long time to come will not require, the organization of a special jurisdiction analogous to that which the Law of 1850 had to establish for secondary instruction. It was therefore expedient to have recourse for this purpose to the action of authorities which are already constituted, and which could offer to the State, as well as to the public, the necessary guarantees of prudence and impartiality. The Commission therefore deemed it fitting to inquire how far the provisions of the Education Law of 1850 might be adapted or not adapted to the present case.

Although the Academical Councils instituted by the Ministry of Instruction for an analogous purpose appear, from their composition and usual manner of proceeding, fitted to decide the questions of discipline which might arise in connexion with technical instruction, there would yet, probably, result rather serious inconveniences from charging them with this duty, entailing on the same persons the examination of questions relating to courses of instruction essentially different, and which it is expedient to keep, in every respect, as distinct as possible. It must not be forgotten that most of the establishments of this kind will be departmental or communal institutions, and that consequently it is natural to leave to the local authorities the care of watching over the constant maintenance of order and discipline in them.

The Prefect, assisted by the Council of the Prefecture, seems therefore the first authority that should be called on to take cognizance of questions of this kind and to deliver judgment in the first instance; more serious penalties, however, being submitted for approval to the Minister. The necessary safe-guard would be created for private interests by giving them the right of appeal to the Minister assisted by a special council, and by giving to such appeal a suspensory effect upon the first decisions. Lastly, a further guarantee would be added to the foregoing by according to persons inculpated the right of appeal to the Council of State. This mode of jurisdiction would require no special creation, and would not bring, either to the prefects or to the councils of the prefecture, any great addition of labour,

seeing that it would be in operation but very rarely. It would further have the advantage of being entrusted to local authorities possessing every desirable facility for instituting inquiries likely to elicit the truth.

Under the influence of these views the Commission came to the following decision :—

“ In case of non-execution of the regulations or of serious disorders in an establishment of technical instruction, the head of such establishment may be subjected to a reprimand either public or otherwise.

“ The private reprimand is pronounced by the Prefect with the advice of the Council of the Prefecture. The public reprimand can only be pronounced in virtue of an authorization from the Minister, and after the head of the establishment shall have been heard.

“ The provisions of Article 68 of the Law of 1850 shall be applicable to the principals of establishments for technical instruction.

“ In any case in which there might be ground for prohibiting the principal of an establishment, whether temporarily or permanently, from exercising his profession, the prohibition shall be pronounced by the Prefect assisted by his council, after inquiry shall have been made and the principal of the establishment heard. Appeal may be made from this decision to the Minister, who shall pronounce judgment with the advice of the Superior Council of technical instruction. The appeal shall have a suspensory effect. Recourse may be had to the Council of State on the ground of excess of power or of violation of the law.” (26th sitting.)

Rights granted to Foreigners.

As some branches of technical instruction, requiring special knowledge of certain manufactures carried on in other countries, may advantageously be propagated in France, it is advisable to permit foreigners to give the necessary instruction, merely subjecting them to certain conditions of public order easily complied with. The Commission give the following opinion :—

“ That foreigners may be permitted to open establishments for technical instruction, or to teach therein, in virtue of an authorization from the Minister.” (26th sitting.)

Superior Council of Technical Instruction.

The many various questions which will arise in the organization of technical education, the examination of programmes, the suggestions necessary to maintain this

education in the right path, the study of the results obtained and of the means of developing them, would alone require the creation of a special council analogous to that which existed formerly under the presidency of the Duke de la Rochefoucauld-Liancourt, under the title of *Council for the Improvement of the Conservatory and the Schools of Arts and Trades*. And such a council is still more indispensable for the more general organization now proposed to be given to technical instruction, and especially in consequence of the decisions just reported relating to jurisdiction and to discipline.

The Commission, therefore, did not hesitate to adopt the following resolution :—

“ There shall be attached to the ministry, a superior Council of Technical Instruction. This council shall give its opinion upon the laws and regulations relating to technical instruction, and upon all questions submitted to it by the Minister. It shall be consulted on the extent and expediency of the encouragement to be given to the various establishments as far as the resources at the disposal of the ministry permit, regard being paid to the quality of their instruction, and to the value of the results obtained.”

“ It shall deliberate upon the penalties and the interdictions to be pronounced in virtue of the foregoing decisions. It shall make reports to the Minister upon the general state of technical instruction in France.” (26th sitting.)

Inspectors.

During the examination of the law on the labour of children in manufactories and of the modifications it might be useful to introduce into it, attention was called to the value of a system of inspection charged with watching over its execution. Further, in order that the proposed Superior Council may have full information on the action of the different establishments, their progress, and the improvements desirable, and also on all the numerous and various points of detail arising out of the establishment and general organization of these institutions, it is indispensable that special inspectors, carefully chosen from amongst the most competent persons, and sometimes even a few members of the Superior Council, should be charged with the investigation of all these questions upon the spot. A system of inspection of this kind might also extend its researches into other subjects within the scope of the Ministry of Agriculture and Commerce, and would at the same time enable the Ministry to collect, without further expense, a multitude of useful documents.

These considerations led the Commission to adopt the following resolutions :

“ There shall be established a system of inspection. The inspectors shall have the supervision of all establishments of this nature, whether aided by grants from the State or not.

“ This system shall be dependent on the central administration, and shall act independently of the local supervision exercised by the prefects, but without weakening the action of the latter.

“ The inspectors shall report on the general order of each establishment and on the results obtained by it. They may require from the principals of establishments that shall have received encouragements from the State, reports as to the number of pupils, the attendance at the school, the employment of time, the methods of instruction, and the results obtained. In no case shall the inspectors be able to dictate alterations of programme and methods. The inspectors shall be present at the sittings of the Superior Council, and may exercise the functions of reporters.”

Works intended for Technical Instruction.

Classical instruction of every degree has for so long a time been arranged and regulated, that instead of having to supply it with books to give ease and certainty to its action, one is rather embarrassed in making a choice among the large number of those which are unexceptionable.

This is very far from being the case with the teaching of the sciences applied to industry, and with technical instruction in its different subdivisions. All the branches of this kind of instruction, which is so diversified, are almost destitute of works drawn up in the true spirit which ought to characterize them, and adapted to the different classes of pupils, from the young apprentices fresh from the primary school to those who pursue studies of a higher order. This dearth of books is as great in commercial studies, geography, the history of commerce, book-keeping, &c., as in the mathematical, physical, and chemical sciences, and likewise in technical drawing. Remembering, too, what has also been said of the difficulty of finding persons who can adapt their modes of explanation to the special requirements and objects of technical instruction, we shall easily understand that its organization in anything like a complete and satisfactory form is and will long be a somewhat arduous task for the Ministry of Agriculture, Commerce, and Public Works.

The measures to be taken for recruiting teachers, and for

showing them the general direction which it would be well to follow, have already been indicated, so far as it is possible to do so, without in any way violating the principle of almost absolute freedom which the Commission desire to leave to local efforts, in the matter of methods of teaching and scientific views. With respect to books, it would be disadvantageous not to make known the preference which some of them might deserve, and perhaps not less so to give them a too exclusive approbation, which might from the beginning create a sort of monopoly.

Acknowledging the great utility of books so written as to respond in each case to the wants of the readers and pupils they are intended for, and at the same time the danger of official approbation, the Commission judged that it ought to confine itself to the expression of the following opinion respecting books and works intended for technical instruction, leaving to the Minister and his Council the task of selecting the measures to be adopted in each particular case:—

“ Among the useful encouragements which it is the duty of the State to give to persons devoting their attention to technical instruction are:—

1. “ Assistance in publishing works specially written with a view to the instruction of the working class population.

2. “ The distribution of such books at reduced prices, and occasionally gratuitously to establishments founded by the local corporations or private individuals.” (2nd sitting.)

Note by the Editor.

On reference to the summary of the aid afforded by Government to science and art education in the United Kingdom (Appendix A., page 163), it will be noticed that (with the exception of those relating to the formalities to be observed, jurisdiction, &c., which from the different system of Government are not applicable to this country) most of the recommendations made by the French Commission on the nature of the action of the Government have already been forestalled here. In granting this aid the Government has kept steadily in view the following objects:—

1st. They have made grants on a system of payment on results only (except building grants in the case of art schools).

2nd. They in every case wait until public or individual exertion in any locality shows that a real demand for the particular kind of instruction exists.

3rd. They leave the local authorities or promoters perfect freedom of action over the details and arrangement of the teaching.

It has not been the policy of the State in this country to aid or interfere with the education of the middle classes, except to some slight extent, and that indirectly, by State endowments in colleges. It has not yet appeared how far the large endowments already in exist-

ence for the benefit of middle-class education can be made available for instruction in science and art. Nothing, however, can have much effect on the grammar schools and middle-class schools of the country generally until the Universities, which give the key of education in the country, allocate a fair proportion of their endowments to the reward of scientific studies. Till such knowledge pays at the Universities the middle-class schools, which look more or less to them, cannot be expected to change their courses of instruction.

As is seen from this report, the Commission, with persevering care and impartiality, has devoted its attention to a general organization of technical instruction in its different degrees, and endeavoured to leave to all local enterprise, whether administrative, municipal, or private, as much liberty of action as possible.

The Commission has examined in succession the questions relating to—

The instruction of apprentices.

Schools of Arts and Trades.

The instruction of workmen.

The industrial instruction of young girls.

Public classes for the technical instruction of workmen.

Advanced technical instruction.

Commercial instruction.

Advanced instruction in the applied sciences.

Libraries.

The teaching of industrial drawing.

The intervention of the State.

During a lengthened inquiry, evidence was received from as many as 30 persons regarded by the public as the best authorities, and numerous and complete reports, giving an account of special missions or describing the organization of a large number of establishments, furnished the elements of discussion. Despite all its zeal and perseverance the Commission cannot flatter itself that it has succeeded in finding complete and altogether satisfactory solutions for questions so extensive, so complicated, and, as yet, so little known. But with the conviction of having fulfilled its duty, it cherishes the hope that, if the paths here indicated be boldly entered upon, time and experience will promptly show what are the improvements to be introduced, and will justify its confidence in the great value of the work to which its efforts have been devoted.

General A. MORIN,

Paris, the 20th of June 1865.

Reporter.

TECHNICAL INSTRUCTION.—DRAUGHT OF BILL.

ARTICLE 1.—Technical instruction has for its object the practice of the useful arts, and the application to the different branches of agriculture, industry, and commerce of those scientific or artistic studies which relate to them.

It may be given to children or to adults of either sex.

ART. 2.—Technical instruction remains in the department of the Minister of Agriculture, Commerce, and Public Works.

ART. 3.—Every French subject who shall have fulfilled the conditions herein-after mentioned may open an establishment for technical instruction without being obliged to furnish preliminary proof of his capacity.

If he intends adding to the technical instruction distinct courses exclusively scientific or literary, he must conform, either personally or through one of his assistants, to the conditions prescribed by the general laws and regulations on public instruction which relate to free establishments.

The disabilities and restrictions provided for by Articles 26 and 65 of the Law of the 15th of March 1850, are applicable to technical instruction.

ART. 4.—Any one who intends to open a technical school must be at least 21 years of age.

He shall declare his intention beforehand to the Mayor of the Commune in which he purposes exercising his profession, and shall make known to him the object and the programme of instruction, and the premises in which he purposes establishing himself.

This declaration shall also be forwarded to the Prefect, who may notify his opposition thereto in the interest of public morals, or if he deems that the establishment proposed, on account of the proposed subjects of instruction, does not come within the application of the present law.

If no opposition on the part of the Prefect be notified to the applicant within one month from the declaration, the school may be opened.

The provisions of the present article are applicable to classes or lectures having for their object one of the branches of technical instruction.

ART. 5.—Any one intending to open a boarding-school for technical instruction must be at least 25 years of age. He is subject to no condition respecting length of previous professional practice.

He must give in to the Mayor and to the Prefect the

declaration prescribed by the foregoing article, and must add to the intended programme of instruction a plan of the premises which he purposes occupying.

The Prefect may notify opposition to the opening of the boarding-school within one month and for the causes mentioned in Article 64 of the Law of the 15th of March 1850. After this interval, if no opposition have been made, the establishment may be opened immediately.

All measures to be taken affecting the morality or the health of the pupils are prescribed by a body of rules fixed by the Prefect on the proposition of the founders of the establishment, and with the advice of the Municipal Council (*Conseil Municipal*) and of the Chamber of Commerce (*Chambre de Commerce*), or of the Consulting Chamber of Agriculture (*Chambre consultative d'Agriculture*) if needs be.

ART. 6.—The Minister of Agriculture, Commerce, and Public Works decides in case of opposition being notified to the opening of technical schools (with boarders or without), classes or lectures, after having taken the advice of the Superior Council instituted by Article 17 of the present law.

He decides, in the same form, on appeals arising from the application of the last clause of Article 5.

ART. 7.—Foreigners cannot open or direct in France establishments for technical instruction except in virtue of an authorization from the Minister.

ART. 8.—All liberty is left to local or individual enterprise in settling the branches of instruction to be taught, the organization of the courses of lectures and of the workshops, the choice of the professors, and of the masters or mistresses, and of the methods, within the limitations fixed by the laws.

ART. 9.—Whoever shall have opened or directed an establishment for technical instruction contrary to Articles 4, 5, and 7, or before the expiry of the period fixed by the said Articles, shall be liable to the penalties enacted by the first clause of Article 29 of the Law of the 15th of March 1850. The establishment shall be closed.

In case of a second offence, the delinquent shall be condemned to an imprisonment of from six days to one month, and to a fine of from 100 to 1,000 francs.

The same penalty of imprisonment and fine shall be pronounced against whoever shall have opened an establishment before a decision have been pronounced in case of opposition thereto, or shall have opened in contempt of such opposition.

ART. 10.—Article 463 of the Penal Code may be applied to the facts provided for by the present law.

ART. 11.—There shall be instituted examinations for the purpose of ascertaining and certifying capacity for giving technical instruction.

The programmes, the practical tests, and, if expedient, the conditions of previous professional practice, are fixed by the Minister with the advice of the Superior Council instituted by Article 17 of the present law.

The examinations take place in the localities specified, and before a special board (*jury*) appointed, by the Minister; they are not compulsory on those who engage in technical instruction.

ART. 12.—In private establishments, the examinations at the conclusion of the studies take place, and the diplomas, if any, are delivered, without any intervention on the part of the authorities.

However, in establishments receiving aid, or which, having regular courses of study, are dependent on Government, certificates of study may be given by local boards (*juries*) presided over by delegates of the Minister.

These certificates, registered at the Ministry of Agriculture, Commerce, and Public Works, have no other value than that of a statement of fact, and do not confer any privilege upon those who have obtained them.

ART. 13.—In case of non-execution of the laws or regulations, or of serious breaches of discipline in an establishment of technical instruction, a reprimand, with or without publicity, may be inflicted upon the principal of the establishment, or his inhibition either temporary or permanent may be pronounced.

The simple reprimand is pronounced by the prefect.

The public reprimand can only be pronounced by the Prefect in virtue of an authorization from the Minister, and after the principal of the establishment has been heard.

In cases where there is ground for interdicting the exercise of the profession, whether temporarily or permanently, such interdiction is pronounced by the Prefect with the advice of his Council, an inquiry having been made and the principal of the establishment heard in his defence.

Appeal lies to the Minister, who pronounces judgment with the advice of the Superior Council, and within a period of two months.

Such appeal suspends proceedings.

Cases where the law is violated or powers are exceeded may be brought before the Council of State (*Conseil d'Etat*).

ART. 14.—Besides the public establishments already existing, or whose formation may be judged necessary, the State shall encourage the efforts of Departments, communes, associations, or private persons for the furtherance of technical instruction, especially as regards the establishment of Sunday or evening schools, schools for drawing, courses of lectures, or regular classes in which any of the branches of this kind of instruction are taught.

In case of the State's co-operation the administration may impose such conditions as may appear suitable for securing the good management and the success of the establishment encouraged.

ART. 15.—The encouragements shall consist, according to circumstances, of grants of money, of distributions of useful books or models, either gratuitously or on favourable terms, and of recompenses to the principals of establishments, to the professors, to the masters or mistresses, to the foremen of workshops, or to the pupils.

ART. 16.—The State shall also contribute by its encouragement in the large manufacturing centres to the formation of institutions similar to the Imperial Conservatory of Arts and Trades (*Conservatoire Impérial des Arts et Métiers*), with collections of models and machines, laboratories for experiments, and public libraries containing works specially intended for technical instruction.

ART. 17.—Attached to the Ministry of Agriculture, Commerce, and Public Works there should be a Superior Council (*Conseil supérieur*) for technical instruction.

The Superior Council is presided over by the Minister or by a vice-president appointed by the Emperor.

It shall give its advice on the laws and the regulations relating to technical instruction and on all questions referred to it by the Minister.

It shall be consulted specially on the expediency, the nature and the extent of the encouragements to be given to different establishments (within the limit of the resources set apart for that purpose), the excellence of their methods and the advantages they offer being taken into consideration.

It shall deliberate upon the notifications of opposition provided for by Articles 4 and 5, and on the inhibitions to be pronounced in virtue of Article 13.

It shall present to the Minister to be submitted to the Emperor a yearly report on the general state of technical instruction, and on the means of developing it.

ART. 18.—A system of inspection may be established for technical instruction.

This system shall be centralized at the Ministry of Agriculture, Commerce, and Public Works, without prejudice to the measures taken in the Departments for the supervision vested in the prefects.

The inspectors shall have a right of supervision over establishments for technical instruction whether receiving encouragement from the State or not.

They may demand from the heads of establishments receiving encouragements, reports respecting the number and the age of the pupils, the hours of labour or of study, the programme of instruction, the methods employed and the results obtained, without in any case imposing programmes or methods.

They shall be present with consultative voice, at the sittings of the Superior Council, and shall perform the office of reporters thereto.

ART. 19.—Technical instruction is added to the instruction for which the master is bound, by the Law of apprenticeship of the 22nd of February 1851, to leave two hours per day at the disposal of the apprentices.

ART. 20.—In future the provisions of the Law of the 22nd of March 1841 shall be applicable to the children employed in any manufactory, mill, or workshop, whatever be the number of the workmen of the establishment.

ART. 21.—The limit of age for the admission of children to work in establishments, which are subject to the Law of the 22nd of March 1841 and to the preceding Article is raised to ten years of age.

ART. 22.—The hours of labour are limited to six hours per day for children from 10 to 13 and to 10 hours per day for those from 13 to 16.

ART. 23.—The compulsory attendance at school, which is established by Article 5 of the Law of the 22nd of March 1841, is extended to youths of from 12 to 16.

Note by the Editor.

The bill of which the above is a draft has not yet become law. It has been referred by the Legislative Body to a Select Committee, consisting of M. Werlé, *President*; M. Eugène-Pereire, *Secretary*; Baron de Benoist, M. Gros, M. Chauchard, M. Lambrecht, M. Jules Simon, M. Guillaume Petit, and M. Pamard.

NOTES.

NOTE I.

SOCIETIES OF PATRONAGE.

THE CHRISTIAN BROTHERS.

IN the first rank, even if we consider only the number of their schools, stand the Christian Brothers, who with enlightened piety have made every kind of effort for the instruction and moral improvement of our workmen in towns and in the country.

At Paris, under the distinguished direction of the Count de Melun, a society for assisting apprentices (*œuvre de patronage des apprentis*) was organized in 1842. It receives on the one hand applications from known and trustworthy employers, and on the other hand applications from families. It superintends the drawing up of the indentures, and always has an explicit clause inserted in them reserving to the apprentices two hours per day for the purpose of attending evening lessons. These lessons have for their object, according to the degree of instruction and the intended career of the children, the completion of the studies of the primary school, ornamental drawing, drawing from the round, modelling, and mechanical drawing applied to the pupil's trade.

There are twenty sub-divisions of these societies of patronage at Paris, where they watch over about 3,000 apprentices. There are about 20 in the Departments.

The youths who have been thus instructed, guided, and protected by these societies maintain their friendly relations with them. Many workmen who have become masters have given in their names as subscribers.

PATRONAGE OF THE SOCIETY OF SAINT-VINCENT-DE-PAUL.

There are at Paris, under the charitable direction of this society, eight houses for the support (*patronage*) of young apprentices, and their religious, moral, and intellectual education.

The society places out the youths with masters of its own choice, looks to the drawing up of the indentures, but without becoming a contracting party, and afterwards watches over the apprentice in the workshops where they are placed at first on trial. The society asks (but without demanding it absolutely) for

the reserve of two hours per day for evening instruction, having for its object the completion of the primary instruction. On Sundays the society's houses are open to the youths from seven o'clock in the morning to 10 o'clock at night, and after attendance at divine service a few lessons are given to and suitable recreation procured for them.

The only resources for covering the cost of this portion of the society's charitable efforts consist in a yearly lottery, which in 1863 gave a sum of from 30,000 to 35,000 francs. This suffices for the support of 1,500 boys, which corresponds to an expenditure of about 20 francs per head.

This expenditure is chiefly for food on Sundays, which costs about 3,000 francs for each house, and also for the purchase of rewards or of articles of clothing; which are sold to the youths by auction, and paid for with the "good conduct tickets" (*jetons de satisfaction*) that have been obtained by them, and which are received as money.

Every evening and on Sundays the youths who are out of their apprenticeship, and those who have become masters, are admitted to a house situated at No. 24 Rue du Mont-Parnasse, where they find various amusements and a billiard-table. Here workmen without work and those sent from the Departments may apply for places; the latter may lodge there for 10 or 12 francs per month. If they board they pay extra.

THE ABBÉ HALLUIN'S HOUSE OF RESCUE AT ARRAS.

A priest of indefatigable devotedness and energy founded at Arras, 15 years ago, an establishment of patronage, which he still directs, and to which he has devoted nearly the whole of his patrimony. He lodges, boards, clothes, and instructs 250 poor or orphan children, chosen from amongst the lowest of the population, and most of whom, unfortunately, from their circumstances and their wretched antecedents are menaced with a life of abject misery.

The youngest children, admitted from nine years of age to 12, and numbering altogether about 80, are first trained for apprenticeship by means of primary instruction and light manual labour in the house, the linen of which they mend under the guidance of four nuns, to whom the whole of the housekeeping is intrusted. The others, from 12 years of age to 20, amounting to about 160 or 170, repair every day at the usual working hours to the workshops of the various trades they have chosen. They return to the house for their meals and for sleeping. During the day the director visits them at their work, and ascertains the progress they have made and their conduct.

No contract is entered into with the masters. The director and the employer remain free, the one to leave or to withdraw the apprentice, the other to keep him or to send him away. The young lads thus apprenticed receive low wages from the masters—at first 10 centimes a week; at the age of 16 they earn

on an average 40 centimes per day. So long as what they earn does not exceed three francs a week, it belongs to the house. Beyond that sum the surplus is placed in their name in the savings bank, and the deposit book is given to them on their leaving the house, which they are always free to do.

These apprentices, early trained to discipline and a regular life, are much sought after by masters, and the establishment has never enough to satisfy all demands.

Within the establishment the children are separated into classes according to their ages, namely, from 9 to 12, from 12 to 16, from 16 to 18, from 18 to 21 and upwards. They rise at half-past four in the summer, and attend a class before going to their workshops. Five or six brothers of Saint-Vincent-de-Paul assist the director in attending to the instruction and the physical welfare of the pupils.

The total expenditure for these 250 children, most of whom are between the ages of 12 and 20, is 70,000 francs a year, or 280 francs for each, everything included. The resources of the establishment are composed of a few small sums paid for pupils' board and lodging, either by the parents or by charitable persons, the very small earnings of the apprentices, and grants of money :—

	Francs.
From the Ministry of the Interior - - -	500
„ Prefect - - -	1,000
„ Council-General - - -	1,200
„ City of Arras - - -	1,200
Total	3,900

“Providence,” says the respected director of the Orphanage, “does the greater part ; besides, we live but poorly, our children sleep almost on straw, and our table is frugal.”

From the foregoing figures it is seen that the grants of money amount to only 3,900 francs out of the 70,000 francs expended, that is, to 5·6 per cent., and that from the State only 1,500 francs, or 2 per cent., are received.

On leaving this establishment, which has brought them up and protected them, the apprentices, accustomed to a regular life, to order and obedience, are generally preferred to ordinary apprentices, and succeed in earning satisfactory wages.

APPRENTICESHIP SOCIETY AT ORLEANS.

(*Œuvre des Apprentis d'Orléans.*)

In the year 1863 this society, which was founded in 1854, was directing and watching over 286 youths, distributed amongst 40 various trades. The average length of apprenticeship is three years. The wages earned by the youths at the close of their apprenticeship vary from 75 centimes to 1 franc 25 centimes. The children are not admitted till the age of 12, and after their first communion. On regular application from the parents or from

an employer the child is admitted provisionally. A member of the committee is appointed to inquire about the child and his parents, and about a master to whom he may be intrusted. When the information is favourable the child is definitively admitted.

The apprentices repair to their employers at the same hours as workmen, and generally do 'twelve hours' work, which is excessive. The society gives neither money nor food to the apprentices or to their parents. The classes are held every evening from seven o'clock to nine. They are three in number. The first class is for drawing, the second class for orthography and arithmetic, the third class for reading and writing. It will be seen that the principal object of these classes is the improvement of elementary instruction.

The resources of the society and its expenditure are indicated in the following table :—

RECEIPTS.		EXPENDITURE.	
	Fr.		Fr.
Foundation for two Brothers ⁷	1,300	Maintenance of two Brothers	1,300
Payments by pupils	2,000	Rewards, prizes, fire and lighting, repairs, &c.	2,600
Government subvention	300		
Given by the town	50		
	<u>3,650</u>		<u>3,900</u>

The small deficit was made good by voluntary donations.

The working of this patronage society is regulated with a degree of order that might be advantageously imitated by similar societies. For this reason it is advisable to give the mechanism in detail.

Application for the admission of a boy to the patronage is made by the parents or their representative on a certain form.—(Form A.) A member of the committee is commissioned to make the necessary inquiries about the boy, his parents, and the master.—(Form B.) The contract of apprenticeship (indentures) is executed in the presence of the society's commissioner.—(Form C.) Provisional admission is declared.—(Form D.) A visitor, from information supplied by the master, draws up a monthly report relative to the apprentice's conduct and progress in the workshop.—(Form F.) The parents, and in their absence the masters, are duly informed by the director whenever the boys miss attending the classes.—(Form G.) At the expiration of the apprenticeship the boy receives a certificate stating the fact and mentioning the rewards he has obtained.—(Form H.)

(FORM A.)

Application for Admission.

I, the under-signed [*names, surname, age, profession, address, and occupation of the father, mother, or guardian of the boy*], hereby solicit admission to the society for [*name and surname*] born at _____ having made his first communion in the parish church of _____ ; having attended the

school ; bound apprentice on the _____ to
Mr. [name, surname, profession, and address of the master if
the boy be already placed].

I hereby engage to submit to the rules of the society in all
things concerning the patronage, and to exert my authority to
make my [son, ward, or apprentice] fulfil his obligations.

Orleans [date].

Signature of the applicant.

(FORM B.)

SIR,

Orleans [date].

THE society requests that you will be so kind as to make
inquiries respecting the persons mentioned in the following
bulletin :

1. Is the boy deserving, by his principles and conduct, to be
admitted to the patronage ?

2. Do the parents and masters in these two respects merit the
confidence of the society ?

3. Is the master capable of properly instructing and training
the apprentice ?

4. Is the workshop well-ordered and of good repute ?

5. Are the parents and master disposed to accept the society's
contract of apprenticeship, with the terms of which you will please
to make them acquainted ?

6. What modifications would they require ?

You are requested to address your reply under cover to the
president of the society, giving your information and observations
on the back of the present letter, and returning the whole to
him as well as the annexed bulletin.

Accept, sir, the assurance of my highest respect.

Signature.

(Write on the back the answers to questions Nos. 1, 2, &c.)

Mr. _____, Member of the Committee.

(FORM C.)

Contract of apprenticeship of _____ to Mr.

(¹) Names and sur- Between the undersigned—Mr. (¹) _____,
name of the master. aged _____ years, exercising the profession
(²) Names, surname, of _____ ; and Mr. (²) _____ (³)
profession, and address of the parent or guar- of (⁴) _____
dian. years.

(³) State whether the In presence of Mr. _____, of the
contracting party is *Apprentice Patronage Society*, intervening
parent or guardian. with the consent of the parties for the amicable
(⁴) Names and sur execution of the present contract.
name of the apprentice-

It has been agreed as follows :—

M. _____ engages to receive as apprentice,

and to keep him for _____ years, commencing on the _____, and ending on the _____.

To teach him thoroughly, and without any reservation, the art and mystery of a _____, to require of him no night work (from nine at night to five in the morning); never to employ him in other works than those of his profession, nor in carrying burdens beyond his strength, nor in too frequent errands exceeding three hours' duration in one day.

To allow him facilities for the practice of his religious duties; never to make him work on Sundays and recognized or legal holidays (Christmas, Easter, Ascension Day, All Saints' Day, &c.), and to send him punctually on working days to the evening school selected by the society, with the memorandum of the week's notes, whenever that may be required of him; to employ him in nothing on Sundays and holidays except arranging the workshop, and in such manner that he may always be free, at the latest, by nine in the morning.

To treat him as a kind father, never to inflict any corporal punishment, to watch over his conduct and morals, both at home and abroad, to inform his parents and the representatives of the society of any serious faults he may commit, or of vicious habits he may manifest; to apprise them without delay in case of absence, illness, or any act of a kind to justify his dismissal; to find him proper attendance in case of illness, until he can be removed to his family or an hospital.

On their part, Mr. _____ and the representative of the society promise to use all their authority to induce the apprentice to remain with his master till the expiration of his service, showing all fidelity, obedience, and respect; that he shall give his master his time and labour, the duration of which must never exceed the limit fixed by law; that he shall consider his master's interests as his own, and make up, at the expiration of his apprenticeship, any time lost through absence or illness exceeding fifteen consecutive days, when the same shall have been noted with mutual consent on the present contract.

The representatives of the Patronage Society are, with the common consent of the parties, authorized to superintend the faithful performance of the present contract; they shall have the right to visit at all times, in person or by deputy, the apprentice in his workshop, and to ascertain his progress in the business.

The contracting parties engage, in all disputes relative to the contract, to have recourse to the arbitration of the persons named by the society before appealing to the tribunals.

Should conciliation fail, the society will lend its aid to any measure or suit having for its object the execution of the present contract, *without the society or its representatives being liable to any responsibility, or to be compelled by the disputants to appear before any jurisdiction whatever.*

Done in triplicate at _____, and signed, being read in the presence of the apprentice. _____,

(FORM D.)

PROVISIONAL ADMISSION.

Orleans [*date*].

will be admitted, provisionally, to attend the classes and meetings of apprentices.

On his assiduity and good conduct will depend his definitive admission.

[*Signature*.]

N.B.—This paper will serve as a ticket of admittance, and must be handed to the Brother having charge of the apprentices.

Entered the

(FORM F.)

MONTHLY REPORT.

Month of 18

*Conduct :**Obedience :**Work :**Punctuality :**Politeness :**Cleanliness :*

Observations. (*Below and at the back.*)

Fill up this report and send it
the Brother in charge.

(FORM G.)

SIR,

Orleans [*date*], 18 .

I HAVE the honour to inform you that your son

did not attend the meeting on the instant

Please to let us know the reason of his absence.

Your most obedient,

[*Signature*.]

(FORM H.)

ORLEANS APPRENTICE PATRONAGE SOCIETY.

Born at

on the

Living at

Son of

Trade of

Entered, on the

at Mr.

Indentures signed on the

Apprenticeship begun on the

Will end on the

Application made for admission to the parentage on the

By { the parents,
the master,
the boy,

On the report of Mr.

Adjourned to the
 Admitted on the
 Pass-book delivered on the
 Mr. Visitor named on the
 Visitor's reply received on the
 Rewards obtained on
 Apprenticeship expired on

Observations.

THE NANTES INDUSTRIAL SOCIETY.

Under the name of Industrial Society (*Société Industrielle*) there was founded in 1832 an establishment whose object and mode of proceeding are sufficiently indicated by the following extract from a report of its labours, dated 21st December 1856 :—

“ The Industrial Society is, most especially, a work of beneficence and Christian charity. Its aim is to teach, assist, and train a hundred boys, sons of working men, for the most part chosen from among the more necessitous; to apprentice them, and enable them to acquire, by means of the theoretical instruction given, a degree of professional skill which they never could have attained if they had received only the education given in primary schools.

“ The vacancies in the school, whether arising from the expiration of apprenticeships or other causes, are competed for every three months.

“ The candidates must be able to read, write, and spell tolerably well, and also know the first four rules of arithmetic.

“ When a pupil is admitted the director of the school must be a party to the contract of apprenticeship, which is signed by him, by the master, and by the boy's father. No one can be received if he have less than three years of his apprenticeship to serve at the period of his admission.

“ The overseers of workshops must engage to allow the pupils to attend the classes two hours every morning: in summer, from half-past five till eight o'clock; in winter, from six till half-past eight.

“ The subjects taught in the school are: writing, grammar, arithmetic, geometry, geometrical drawing, and artistic or ornamental drawing, according to the trade the boy has chosen. Only those are admitted for whose trade drawing is necessary.

“ The children of necessitous parents receive three kilogrammes of bread weekly, or $4\frac{1}{2}$ kilogrammes if they are orphans; clothing is also given as a reward for industrious application at school.

“ In addition to this, a sum of three francs is granted to each pupil every month; one half of this is to be deposited, by the directors of the school, in the savings bank so as to form a reserve of fifty-four francs against their leaving school; the other half is given to them monthly, provided they have behaved well. When they offend against the rules or neglect their duties, a fine of twenty-five centimes is imposed, and paid into a relief fund to assist the more necessitous.

" The pupils are under supervision both in the school and workshop.

" The professors are paid.

The revenue of the establishment consists of:				Fr.	c.
3 per Cent. Rentes	-	-	-	1,528	00
Subvention of Municipal Council	-	-	-	2,000	00
Subvention of Council General	-	-	-	1,510	00
Subvention of Ministry of Commerce	-	-	-	1,000	00
Subvention of Ministry of Public Instruction	-	-	-	250	00
Charitable subscriptions	-	-	-	4,105	00
Arrears of subscriptions	-	-	-	30	00
Incidental payments	-	-	-	1,337	26
Total				11,750	26

" It is worthy of note that the State contributes only 1,250 fr., or about 10 per cent., of these resources.

" The expenditure in 1856 rose to 12,612 fr. 85 c., chiefly owing to the higher price of the bread distributed to the pupils."

The school has nearly always had its full complement of 100 pupils, generally belonging to different trades in the following proportions:—

Locksmiths	-	-	-	-	-	16
Fitters	-	-	-	-	-	14
Joiners	-	-	-	-	-	13
Mechanics	-	-	-	-	-	10
Fitters in foundries	-	-	-	-	-	8
Moulders	-	-	-	-	-	7
Carvers	-	-	-	-	-	6
Boiler-makers	-	-	-	-	-	4
Tinsmiths	-	-	-	-	-	3
Compositors	-	-	-	-	-	3
Ship carpenters	-	-	-	-	-	3
Founders	-	-	-	-	-	2
Painters	-	-	-	-	-	2
Stone cutters (2), marble-worker, plasterer, upholsterer, binder, jewel mounter	-	-	-	-	-	6
Total						97

SUPERIOR MUNICIPAL PROFESSIONAL SOCIETY OF NANTES.

A school of secondary professional instruction was established in the same city by M. Leloup, in 1833, in virtue of a resolution of the municipal council voted under the influence of the late M. Billault, for the purpose of giving other young men a somewhat higher degree of instruction, though still technical and combined with manual labour in the workshop of an employer.

Being partially supported by the city of Nantes until 1842, the school had 250 pupils. At that date the city withdrew its assistance, and the situation of the school became precarious; but by raising the pupils' payments from 5 francs to 8 francs a month,

the position of the establishment was improved, and it now has from 150 to 160 pupils, belonging to the families of tradesmen and the upper class of workmen.

The pupils are admitted at 12 years of age, and are expected to have received elementary education.

From eight till nine in the morning, and from five till six in the afternoon, their time is employed in the study of elementary and descriptive geometry, elementary mathematics, geography, history, chemistry and physics. They return to their families in the evening.

From ten till five o'clock they work at their employer's, where they are efficiently overlooked. They serve gratuitously for three years, and receive wages during the fourth.

Prizes are awarded every year to both masters and apprentices.

PROTESTANT SCHOOLS.

There are in Paris about 40 schools especially intended for the children of Protestant parents, and they receive about 2,800 pupils. One establishment, called the St. Marcel Mission (*Œuvre de Saint-Marcel*), founded in 1847, contains seven classes, comprising 600 pupils.

The monthly payment is only 1 franc per head, and that is reduced to one half for the poor. The children remain from six till twelve years of age, and primary instruction is carried farther than in ordinary schools, as it includes drawing and commercial arithmetic. The girls are taught needlework.

The expense of these schools is chiefly defrayed by voluntary donations.

When the boys leave the schools, the managing committee sees that they are apprenticed to some trade; it is a party to the contracts made with the masters, and sees to their fulfilment; but the committee, notwithstanding its zeal, has little influence over the masters, and cannot prevent them from keeping the boys at work part of the day on Sundays. It has therefore appealed to the Government for legal aid.

No statistical returns have been supplied regarding the results of this society.

It is endeavoured to bring the young apprentices together on holidays, with a view to procure innocent amusements for them, and to preserve a moral tone among them.

This society has established in the Rue de Charonne a kind of lodging-house, called the Workman's Home (*famille ouvrière*), where it lodges and boards, on very moderate terms, workmen and apprentices whose families do not live in Paris. It is engaged at the present time in preparing another for German workmen, resembling the *Heberge* of their own country.

JEWISH SOCIETIES.

In 1825 a number of liberal-minded men, at the head of whom was M. A. Ratisbonne, being convinced of the necessity of rescuing the children of a part of the poorer Jewish population of the Department of the Bas-Rhin from their deplorable pro-

penalties for trafficking and chaffering, and of giving them habits of industry and morality of a nature to render them useful citizens, formed on their behalf a Society for the Encouragement of Industry (*Société d'encouragement au travail*).

Authorized by a royal ordinance of the 18th April 1842, this society, after having overcome the first difficulties with persevering devotedness, gave to the establishment it had founded the name of School of Arts and Trades (*École d'arts et métiers*), and a second similar school was established at Mulhouse for the Jews of the Department of the Haut-Rhin.

Neither of these schools realizes what is usually understood by that word ; they are in reality establishments for indoor teaching with an outdoor apprenticeship ; they are, however, for that reason the more remarkable and the more interesting, and their organization, their results, and the intelligent and strict economy with which they are conducted are well worthy of being studied.

The poor Jewish children, admitted by election to share the benefits of the society, are lodged, boarded, and clothed ; they receive in the school an almost complete primary instruction, but they are not allowed to remain after they have attained their fourteenth year.

The masters with whom they are placed are selected from among those who occupy a respectable position among the manufacturers of the neighbourhood.

The apprentices are placed out by a committee, which draws up the indentures with the factory overseers, watches over the instruction of the pupils as well as their religious and moral education, conduct, cleanliness, &c.

The boys leave for the workshops from five to six in the morning, according to the season ; they return to take their meals at the establishment, and come home finally in the evening at eight to receive instruction in French, arithmetic, geography, history, drawing, elementary geometry, and religion.

Although these classes are held in the evening, after the day's work, the pupils appear to attend them with much zeal. All the masters are paid.

The services rendered by these charitable institutions are so highly appreciated that the number of pupils is only limited by the pecuniary resources and the size of the building. There were in 1862 at Strasburg 58 indoor and 20 outdoor pupils, many of them children of Christian parents.

Payment is received for some of the indoor pupils, the charge being fixed at 350 fr. (14*l.*) per annum.

The order and economy with which the establishment is conducted are such that the clothing, board, lodging, and instruction of each pupil has cost on an average, during a period of eight years, but 267 fr. each, and in 1862, 265 fr. only.

The annual revenue of the society amounted in 1862 to 25,440 fr. 15 c. Of that sum the State furnished the small contribution of 500 fr., or 2 per cent.; the Municipal Council, 2,000 fr.; the Council-General of the Department, 1,000 fr., a total of 3,500fr., for about 12 per cent. The rest is obtained from private bounty.

The pupils who have left the establishment appear to preserve a grateful recollection of it, which is often manifested by the assistance they render in contributions and donations.

Besides the young workmen put out as apprentices, the school at Strasburg has selected from among its most promising pupils some who have been sent to the Primary Normal School with the view of training them as permanent teachers for the Jewish schools, and of propagating in the the two Departments the benefits, hitherto too much despised, of elementary instruction.

The school at Mulhouse is not less prosperous than the one at Strasburg. It dates from 1841, and the association by which it was founded was recognized under the title of the Jewish Philanthropical Society of the Haut-Rhin (*Société philanthropique Israélite du Haut-Rhin*), by a Decree of the 18th August 1850, as an establishment of public utility.

In addition to the encouragement of manufactures and a taste for the industrial arts, sciences, and professions, the society aims also at the training of Jewish farm labourers, in order by this means to effect the extinction of mendicity, by utilising, to the profit of the society, individuals enervated by destitution.

In 1862 the establishment at Mulhouse contained 40 pupils, who are admitted gratuitously, by election, from 14 to 16 years of age. The day's labour commences at five in the morning and terminates at 10 in the evening; from nine to ten hours are devoted to work for the masters, the rest to repose or study. The Saturday and Sunday are devoted, after the religious services, to study and recreation.

Some pupils, who pay a sum not exceeding 500 fr., are also received.

The revenue of the establishment amounted in 1862 to 20,132 fr. 15 c.

Of that sum the State only contributed 300 fr., or $1\frac{1}{2}$ per cent.

The Council-General - - - 1,000 fr., or 5 per cent.

The towns of Mulhouse, Colmar,

and Ribeauville - - - 800 fr., or 4 per cent.

Together 2,100 fr. or $10\frac{1}{2}$ per cent.

The rest was furnished by subscriptions and by the interest on the capital already invested.

The expenditure amounted in 1862 to 12,727 fr. 25 c., for the pupils, or about 417 fr. each.

In addition to the attention paid to the pupils during their stay in the school, the two societies watch over them after they have left, and with that object have placed themselves in connexion with the Society for the Assistance of Apprentices, and the Jewish charitable institutions in Paris.

PARIS SOCIETY FOR THE PATRONAGE OF JEWISH APPRENTICES AND WORKMEN.

This association, placed under different and perhaps more difficult conditions than those of the departments, has for its

object the placing out and supervision of apprentices, and the custody and reformation of boys and girls who after being convicted of crime have been confided to the Jewish Consistory.

It is conducted, however, in the same manner as the two others, with this difference, that it does not lodge young people, but puts them out to board for want of sufficient house accommodation.

Classes are held in the evening after the day's work. The central establishment is situated No. 4, Rue des Rosiers.

Like the Mulhouse society, that of Paris intends to form an agricultural colony.

In fine, these institutions, founded to promote the moral improvement of the poorer Jewish population, prosper and increase almost solely by the aid of private charity, and offer an example of the satisfactory solution of the question of apprenticeship under the control of societies formed for that object.

NOTE II.

SPECIAL WORKSHOPS FOR APPRENTICES.

APPRENTICE SCHOOLS IN BELGIUM.

Belgium offers, in Western Flanders, by her communal schools for apprentice-weavers (*écoles communales d'apprentissage*), a remarkable example of the results that may be obtained in such institutions. These schools, in which primary and religious instruction is united with manual labour, are intended for the children of poor parents and are adapted to the industry of the neighbourhood, namely, weaving. The communes, aided by the State, have provided a building with looms, and under the direction of a paid overseer these school-shops work up raw material furnished by manufacturers of the neighbourhood. The apprentices receive small wages, which increase with their capacity, until they know their trade well enough to be admitted into the factories, where they can earn a living. From 55 to 60 apprentice schools of this kind are distributed over as many communes, and receive from 13,000 to 14,000 pupils. The official reports published at Bruges in 1863 show that everywhere instruction and habits of regular employment have produced the most successful results in improving the morals not only of the children, but also of the parents, and that mendicancy and vagrancy have almost entirely disappeared from those districts.

When the first attempts were made to organize apprentice-schools for the different sorts of manufactures, the exclusive and almost absolute direction was confided to masters who had an interest in them. It was, however, soon discovered that the

authority charged with watching over the execution of the indentures on behalf of the children had not sufficient powers ; consequently the majority of the institutions of that kind were allowed to die out, and in their place were substituted communal workshops, (1) "created exclusively for the professional instruction of the working classes, and in the general interest of trade, the committees of which endeavour to vary the instruction of the pupil as far as possible.

* "The pupils of those workshops are usually compelled to attend school for two hours, and while the apprentice thus derives a rest by this cessation from labour, he at the same time acquires knowledge admitting of a general application. Experience has proved that the introduction of literary and moral instruction is effected with the greatest facility in those communal workshops in which it was not practised, and that it produces an excellent effect on the character and morals of the young workmen (2).

"It has even been found that in the space of time devoted daily to instruction in reading, writing, the rudiments of arithmetic, &c., the pupils who attend the workshops learn almost as rapidly as those who are obliged to remain all the day at school" (3).

This remark agrees with the observations made in England on the half-time schools. The object of these workshops not being merely to show the child a loom which is to enable him to gain a livelihood, but also to contribute to his intellectual and industrial progress, (4) "it is sought to instruct the pupils not only in weaving, properly so called, but also in the preparation of the warp, in arranging the loom for the execution of different patterns, in deciphering designs, and, in short, everything belonging to the weaver's art."

In 1863, out of 54 apprentice workshops established, in 40 primary instruction was being given to the extent desired, and in 14 only was it not completely organized. According to the official returns the organization of those special apprentice workshops, which only date from 1851, and are at present 54 in number, comprise :—

Looms	-	-	-	-	1,285
Apprentice pupils	-	-	-	-	1,652

The number of workmen they have trained during a period of 12 years amounts to 13,481, the greater part rescued from want, mendicity, and all the vices they engender.

Let us add, in conclusion, as is remarked by the author of the report, M. Renier, Inspector of the Apprentice Workshops, that a number of young apprentices who had never entered a school have left the workshops with a fair knowledge of reading and writing, and that this important result has been obtained in the

¹ Page 5 of the report on the situation of the apprentice workshop in Western Flanders in 1863.

² Page 11.

³ Page 12.

⁴ Page 15.

greater part of the communes which contain a workshop. It evidently results, from this observation, that the workshop, far from taking boys from the schools, is with the aid of a good organization a powerful means of extending the benefits of instruction and of counteracting the selfish and short-sighted conduct of parents, who, without concerning themselves for the future, only think of the trifling salary to be earned promptly by an ignorant workman.

ESTABLISHMENT OF ST. NICHOLAS, RUE DE VAUGIRARD, PARIS.

As a second example of the good results obtained, we may mention the workshops of the establishment of St. Nicholas, Rue de Vaugirard, Paris, and Grande Rue, Issy, founded in 1827 by Mgr. de Bervanger, and directed since 1859 by the Christian Brothers.

They are twelve in number in Paris, for the trades of metal-chasers, bronze-workers, lens-grinders, musical instrument makers, shawl pattern designers, gilders, manufacturers of imitation jewelry, bookbinders, carvers in wood, trunkmakers, saddlers, and shoe-makers; and there is one at Issy for gardeners.

In all these workshops the pupils are placed as apprentices, at the disposal and under the direction of masters, who employ them on their own account, furnish tools and materials, and instruct the boys, either themselves or by the aid of foremen. The proceeds belong to the master, who during the first three years pays nothing for the work of his apprentices, but in the fourth year gives the establishment one franc per day for the services of each pupil.

The number of apprentices is 100 in the Rue de Vaugirard, and 60 at Issy. They are lodged in the establishment, boarded, clothed, and provided with everything, for a sum of 360 fr. per annum, payable monthly in advance. In addition to the employment in the workshops, which lasts nine hours daily, the pupils pass two hours in the classes, and receive drawing lessons three times a week. And their education is completed by paternal supervision, regular discipline, and religious and moral guidance.

From information furnished both by a personal visit of the Commission of Inquiry to the workshops, or by details communicated to the Commission by M. Gouin, civil engineer, it appears that after four years' apprenticeship an industrious pupil is able, on leaving the workshops, to earn, according to his trade, from four to five francs a day.

This opinion is confirmed by the following return of the average wages obtained by apprentices who left the establishment of St. Nicholas between the years 1859 and 1864 :—

				Fr.	c.
Bronze-chasers	-	-	-	4	22
Lens-grinders	-	-	-	3	94

				Fr.	c.
Shawl pattern designers	-	-	-	4	04
Gilders	-	-	-	3	00
Jewellers	-	-	-	4	00
Wood carvers	-	-	-	4	00
Trunk makers	-	-	-	3	75
Saddlers	-	-	-	3	50
Musical instrument makers	-	-	-	3	62
Cabinet-makers	-	-	-	3	25

These figures show, beyond dispute, that the apprenticeship is a real one, as young men of from 16 to 18 years of age are able to earn such good wages on first entering the trade.

APPRENTICE-WORKSHOPS OF THE CHRISTIAN BROTHERS.

Similar establishments, but specially established to meet the requirements of the local manufactories, have been founded by the Christian Brothers at Nancy and St. Omer.

At Igny (Seine-et-Oise) a school for apprentice gardeners was founded in 1860. It has at present 60 pupils, to whom, in addition to practical labours, are taught the principles of market gardening, arboriculture, ornamental gardening, &c.; while at the same time their primary instruction is completed.

At Beauvais the same fraternity has an agricultural school of a higher order for young men brought up as farmers, and even for those destined to become teachers. It generally contains 25 pupils, who acquire the necessary instruction in two years. The system is that of a boarding school, and the charge for admission is 800 fr. per annum. After an examination before a board named by the prefect, those who are successful receive a diploma. A large portion of the pupils of this school belong to the families of farmers of the neighbourhood, and are at once able to turn to account the knowledge they have acquired; others become managers of farms, teachers of agriculture, or directors of public gardens; as many as ten have adopted the career of professors.

Under the auspices of the late M. Chabrol-Volvic, the Christian Brothers opened at Volvic a school for teaching the art of building, in which skilled workmen served as instructors to the pupils. This establishment, founded by M. Chabrol-Volvic, who endowed it with a museum of sculpture, receives indoor pupils on payment of 400 fr. per annum. The age of admission is fixed at 14 years. Pupils of the communal school of Volvic who have distinguished themselves are received for outdoor instruction on payment of 50 fr. yearly. The course of education comprises the French language, arithmetic, algebra, geometry, trigonometry, land-surveying, levelling, the drawing of plans, descriptive geometry, stone-cutting, carpenters' work, architectural drawing, modelling, carving, statics, mineralogy applied to building, and the laws relating to constructions.

This school, established in a district which furnishes so large a number of workmen for the building trade, is thus a really theoretical and practical training institution for the art of building. It contains only a small number of pupils, but many young men who received their instruction there have obtained good situations with large firms in the trade.

At Lyons and St. Etienne apprentice workshops for teaching the use of the jacquard loom, preparing the cards, &c. was in successful operation for 10 years, under the management of the Christian Brothers ; but in 1848 a ferocious mob ravaged the establishment, and the Brothers have not had the courage to make a fresh beginning. An almost similar event occurred in Paris, where an institution of the same class, established in the Rue St. Etienne-du-Mont, had as many as 200 pupil apprentices : these the Brothers at that lamentable period were obliged to send away in consequence of a menace that the establishment would be burned down in case of a refusal. Were it not for such barbarous acts, which cannot be explained by chimerical fears of the competition of private industry, it is probable that the apprentice workshops of the Christian Brothers, confided to masters interested in giving to their pupils not only a practical teaching but also the habit of working rapidly, would have successfully increased, and would have been spread over the surface of the country like their primary schools.

AGRICULTURAL ORPHANAGE AT BOUFFARICK.

An establishment was founded at Ben-Aknoun, near Algiers, in 1844, of which the principal centre was removed in 1851 to Bouffarick, for training abandoned children, or those belonging to poor parents, as agricultural labourers. It is placed under the direction of delegates of the order of Jesuits.

The land cultivated consists

At Ben Aknoun of	87	hectares	(2½ acres each).
At Bouffarick of	37	"	"
Together -	124	"	"
At Sidi-Abet (marsh)	200	"	"

The workshops and cultivation are carried on by 302 masters, workmen, or pupils, divided as follows :—

Director and masters	-	-	6
Workmen of different trades	-	-	13
Agricultural labourers	-	-	33
Pupils	-	-	250
Total	-	-	302

The instruction comprises, in addition to the studies of the primary schools, the different trades connected with agriculture. It is essentially practical, and is given under the direction of master workmen in each workshop. When a boy is of an age to choose a trade the directors observe his tastes and qualifications, and recommend to him the calling which they consider the most suitable for him. The principal occupations are farming, vine growing, gardening, nursery culture, cattle breeding, the rearing of farmyard produce, farriery, cart building, and carpenters' work.

The revenue of the establishment consists of the following subventions :—

			Frs.
Province of Algiers	-	-	- 30,000
„ Constantine	-	-	- 15,000
Total	-	-	- 45,000

The establishment grows its own vegetables and corn, and also derives some profit from its vines and nurseries.

The majority of the pupils enter the agricultural establishments on the following conditions :—

Salary, besides food, in the plain, 30 francs per month.

Salary, beside food, on the mountain, 20 francs to 25 francs.

The Emperor visited Bouffarick in 1865, and had an opportunity of admiring the beauty of the gardens and orchards, the healthy appearance of the pupils, and their earnest application to labour. The official journals bore witness to the satisfactory impression this visit left on the mind of his Majesty.

POWER-LOOM WEAVING SCHOOL AT MULHOUSE.

(Ecole de Tissage Mécanique de Mulhouse.)

The apprentice-workshops are not only of use in forming simple workmen ; they may also constitute a sort of technical and special schools, for preparing educated youths for the direction of manufactories. With this view, some manufacturers of Mulhouse, convinced of the utility of a complete instruction in the principles which should guide the manufacturer of the great variety of stuffs now produced, and enlightened by the example of Germany, raised by subscription in 1861 a fund of 37,000 francs destined to found, as an experiment, a school of weaving with power-loom. This school, which is placed under the direction of M. E. Friès, admits 30 or 40 out-door pupils, who pay a certain sum yearly and receive a theoretical and practical instruction in the process of weaving, sufficient to enable them to superintend manufactories.

To show in what degree such institutions meet the requirements of trade, it will not be without interest to exhibit the progressive results of the administration of that school during the first three years of its existence :—

The above table shows that after scarcely three years' existence and experience, this school, in which the number of pupils was at first only ten or twelve at the most, has been able to organize itself, purchase its material and a steam engine, and yet, having borrowed for that purpose only 28,739 francs from the subscription fund, it has obtained a net profit (its material and all expenses being paid) of 3,879 francs at the end of the third year. This result, which proves what benefit the manufacturing towns derive from making a judicious outlay for the promotion of technical instruction, determined the founders to give to their school of weaving a definite constitution, and to form, with that object a company with a capital of 76,000 francs, divided into 76 shares of 1,000 francs each, which were subscribed for immediately.

At present, the school is established in a building erected for the purpose ; it is provided with a steam engine, with everything that is necessary for transmitting the motive power, and 24 different looms, on which various stuffs may be manufactured. It works not only as a theoretical and practical school of weaving, but also as an ordinary factory, so as to cover by the sale of its productions a part of the outlay.

Its financial position in the month of September 1864, was as follows :—

		Frs.	c.
Capital, 76 shares at 1000 francs	- - -	76,000	00
Funds disposable on the 1st March 1864			
from the first subscription	- - -	8,260	75
Surplus of receipts over expenditure in 1863-1864	- - - - -	3,879	70
Capital disposable on the 1st March 1864		88,140	45
Expendi- { 1st March 1864, purchase of ground			
ture. { .. and costs - - - - -		10,018	00
{ 1st September 1864, building of			
{ workshops - - - - -		56,000	00
Total expenditure	- - -	66,018	00
Balance - - - - -	- - - - -	22,122	45
		88,140	45

The school opened under these favourable conditions on the 3rd October 1864.

The studies are partly theoretical and partly practical, the pupils passing alternately and regularly from the one to the other. The theoretical studies consist principally of the decomposition and analysis of all kinds of stuffs, especially those which concern the manufactures of Alsace. The course is terminated by mechanical drawing, the study of the internal

arrangements of manufactories with plans and estimates, the calculating of the cost price of manufactures, and book-keeping. The practical studies consist of the working of the looms, the fitting up, regulating, adjusting, preservation and repair of all the machinery, and lastly the weaving itself in all its operations by the pupils themselves, assisted by an experienced foreman.

The charge of admission to the theoretical and practical course of studies is 600 francs for the scholastic year of eleven months, but the pupil is at liberty to attend only one of the two courses. Foreigners are admitted as well as Frenchmen.

These studies are terminated by examinations before a board of manufacturers and engineers, which delivers certificates of capacity to the successful candidates. At this examination the pupils have to submit to the board a general plan of the school, with its steam engine and apparatus for the distribution of the motive power, and with drawings of the different machines, and the complete plan of a manufactory.

It will be seen by the above details that nothing is neglected in the studies of the pupils, so that those who have received certificates of capacity are at once competent to direct manufactories of various kinds. We must add that the manufacturers who founded this school of weaving are precluded from participating in the profits the establishment may make, and that they have only a right to the legal interest on the money they have advanced, and its re-imbursement on the breaking up of the association.

SPINNING SCHOOL AT MULHOUSE.

(Ecole de Filature de Mulhouse.)

The success obtained by the school of weaving induced the masters of some of the principal spinning factories to create for this latter branch of industry a similar establishment, in which while carrying on the ordinary work theoretical and practical instruction should be given to young men who, after having completed the necessary general studies, and even some of a technical nature, should wish to engage in this branch of trade. This school, also founded by the generous co-operation of a number of mill-owners, has been open since the end of 1864, under the direction of M. J. M. Weiss, formerly assistant to M. Alcan, in the class of spinning professed by the latter at the Paris Conservatory of Arts and Trades.

In addition to the theoretical studies connected with spinning, there is a practical course of instruction which includes the mounting and fitting of the machines, their preservation, the study of the different varieties of cottons, their use, the proportion of waste, the cost price of material, book-keeping, &c. The ordinary duration of the studies is fixed at two years, and the payment is 600 francs per year of 11 months. There is every reason to believe that this school, which is intended to facilitate

the apprenticeship, often long and difficult, which young men already acquainted with the general principles of mechanics, such as pupils of the Central School, the Schools of Arts and Trades, &c., are obliged to undergo to render themselves competent to direct spinning mills, will succeed as well as the School of Weaving, which has served as its model, and will be of real utility, not only to manufacturers in general, but also to individuals.

Such foundations, due to the intelligent enterprise of the manufacturers of Mulhouse, are so deserving of the esteem and sympathy of all the friends of industry that it has been thought advisable to enter into the foregoing details, which it is hoped may induce the proprietors of great establishments in other trades to imitate them.

SCHOOL OF SPINNING AND WEAVING OF THE INDUSTRIAL ASSOCIATION OF AMIENS.

(Ecole de Filature et de Tissage de la Société industrielle d'Amiens.)

Like the industrial association of Mulhouse, that of Amiens has given a remarkable example of what may be produced by local enterprise when undertaken by intelligent men, devoted to the public interests. Persuaded that the surest means of meeting foreign competition was to diffuse among the masters, clerks, foremen, and workmen the scientific and technical knowledge connected with the branch of manufacture in which they are employed, this association formed the project of opening public classes in the principal manufactures of the Department, which comprise the spinning of wool, flax, and cotton, the manufacture of hosiery, and the weaving of cotton, velvet, linen, and other stuffs. Instead of following the plan too frequently adopted in France, and having recourse to the Government to meet the first outlay in this undertaking, the association appealed to the patriotism of the manufacturers, tradesmen, and workmen of the Department. Its confidence was not misplaced, and by means of the donations of some heads of firms, and the assistance of a certain number of workmen, who gratuitously devoted their leisure hours, the establishment it has founded possesses a steam engine, and numerous improved looms, the value of which exceeds 30,000 francs. Since the 15th January 1864, a class of weaving has been opened in a building which the association has taken on lease.

To this course of instruction which concerns its special branch of manufacture the association has been able to add a course of lectures on dyeing, with a well-stocked laboratory, for the establishment of which it has also had recourse to the enlightend patriotism of the principal dyers of the neighbourhood. Lectures on practical mechanics by a former pupil of the Polytechnic School, attached as engineer to the Northern Railway, English and German classes, and one of mechanical drawing, complete this organization, which reflects the greatest credit on the generous and enlightened men who founded it.

A member of the Commission, charged by [the Minister of Public Instruction to be present at the opening of the] course of instruction on weaving, saw at work, under the direction of skilful and zealous professors, looms of the kind employed in the Department, which had been presented to the institution by the principal manufacturers of that industrial district. There is no doubt that the existence of such examples, crowned with a well-deserved success, will excite in many other manufacturing centres a generous and profitable emulation.

COZETTE INSTITUTION AT AMIENS.

This establishment, which owes its origin to a legacy of 260,000 francs left to the town of Amiens by M. Cozette in 1842, is principally intended to furnish assistance and employment to townspeople of both sexes reduced to a state of mendicity. In addition to the assistance given to the poor in accordance with the will of the testator, the local committee has opened in this establishment workrooms which contain about 45 poor young girls rescued from mendicity and vagrancy. Under the direction of a Sister of Charity these young girls are employed in the making up and repair of the body linen and sheets lent by the establishment to 450 indigent persons. They also receive religious and primary secular instruction.

The young girls are admitted from the age of ten years. They are received gratuitously, and are allowed a small remuneration of from 50 centimes to one franc per week, until they are able to work. When they have learned to use the needle and are able to work well they are allowed to receive all their earnings. They are kept in the establishment until they are in a position to go out to service or to obtain employment as seamstresses. They are all lodged outside the establishment, and their annual cost, after deducting the produce of their labour, is 30 francs each pupil. On leaving they can earn from 50 centimes to one franc a day, according to their capacity.

The revenues of the workshop is derived from a grant of from 1,200 francs to 1,500 francs a year made by the town, and from the produce of the younger pupils' work.

ASSOCIATION FOR THE PROFESSIONAL INSTRUCTION OF WOMEN.

(*Société pour l'enseignement professionnel des Femmes.*)

This association, founded in May 1862, was at its origin united to another called the Society for Maternal Protection (*Société de Protection Maternelle*), and then consisted of 50 members, who each subscribed an annual sum of 25 francs. With these small resources, but confident of the utility of its purpose, the association opened its school on the 15th October 1862, in the Rue de la Perte, with only six pupils. Six months later the number of pupils had increased to 40, that of the subscribers to 105, and the association had received in donations a sum of 4,055 francs. Its income, including the school

fees, which are eight francs per month, already amounted to about 9,000 francs.

At the end of 1864 the principal school, removed to the Rue du Val-Sainte-Catherine, had 146 pupils; the branch in the Rue Rochechouart had 16, in all 162.

The number of subscribers of 25 francs each is 203,	
producing - - - -	5,075
Thirty-five subscribers of 15 francs and under - -	375
168 founders, subscribing each 30 francs - -	5,040
The school fees of 80 francs for six months should produce at least - - - -	8,000

Total resources 18,490

By degrees, as the number of pupils increases, in consequence of the reputation the instruction given has acquired, the income from the school fees will become more considerable, and the institution will have less need of subscriptions.

While the number of pupils has increased, the instruction, which was at first limited to three classes,—one of general education, one of commercial instruction, and the third of needlework,—has been extended, and now comprises the following subdivisions:—

Three progressive classes of general studies, in writing, French, and drawing; three classes of progressive commercial studies; two classes of the English language; a room for needlework (making up household linen); a class for drawing (30 pupils); a workshop for wood engraving (10 pupils).

Thus in less than two years an institution the value of which is proved by its success, has been established under a system of generous support and able management by private initiative alone, whilst in the same city of Paris a school in the receipt of large grants from Government has produced very small results, as the Commission is able to testify.

ASYLUM OF SAINTE-MARIE-AUX-MINES (Haut-Rhin).

This institution, founded on a small scale by several manufacturers, at the head of whom may be placed M. Diéterlin, is intended to rescue from immorality a few young girls belonging to depraved parents. Its object is:—

1. To repair, by a good moral training the influences of previous vices.

2. To give a complete primary education.

3. To secure to the young girls the means of earning a respectable and independent livelihood, by teaching them a trade. For this purpose that of weaving has been exclusively adopted, it being the occupation of the whole valley of Sainte-Marie-aux-Mines.

4. To instruct them at the same time in the duties of a future mother of a family belonging to the working classes, in order that the young girl on leaving the institution may not find that she has been raised above her position.

To attain these objects a home has been formed, and placed under the direction of a former schoolmistress. It consists at present of 13 young girls, taken from the lowest families, many of whom have been living by mendicity; they usually enter at 14 or 15 years of age, after they have been confirmed. To this home is added a workshop, with eight looms, directed by a married overseer, who lives with his family outside the establishment. As there are only eight looms for 13 children, they work at them by turns; while some are weaving, the others are occupied in the kitchen, or in washing, learning to sew, mending, ironing, &c. Their instruction is completed by lessons of reading, writing, and arithmetic. On leaving the establishment, after remaining there two years, they are able to earn as weavers from 1 franc 50 c. to 2 francs a day. It frequently happens that on the expiration of their apprenticeship they prefer to go out to service. The annual cost of each pupil is about 350 francs, of which 150 francs is covered by the work of the children, and 200 francs by voluntary subscriptions.

The pupils being taken from the lowest class of society, the institution is obliged to be satisfied with small moral results. The facts, however, are encouraging; after having become accustomed to habits of order, cleanliness, and labour in the home, the young girls are happy, and are generally attached to their mistresses. One of those who are at present in the house was a beggar; five times she ran away from the home to return to her former vagrant life; now she is one of the best of the pupils.

ORPHANAGES AND APPRENTICE-SCHOOLS IN THE DEPARTMENT OF CALVADOS.

(Orphelinats et Ecoles d'Apprentissage du Département du Calvados.)

With the same object, but in the interest of the local manufactories and for the benefit of the poor children of labourers, there was established in the year 1838, in the Department of Calvados, by the pious and charitable exertions of several ecclesiastics, 18 establishments in the towns of Caen, Bayeux, Lisieux, Vire, and Condé-sur-Noireau for orphan boys and girls, in which, under the direction of paid masters and mistresses, they are trained to the following occupations:—Boys: carpenters, carvers, turners, stocking sewers, shoemakers, cloth weavers, wool and rag cleaners, and gardeners. Girls: seamstresses, laundresses, embroiderers, and lace makers.

All these establishments are maintained and are being increased solely by the assistance of the municipal councils, by charitable

subscriptions, and by the produce of the children's work. (*See the report of the Prefect of Calvados.*)

The apprentices leave with a moral and religious training which serves them as a rule of conduct in life. They have besides acquired practical instruction, such that they can earn salaries which, according to information obtained on the spot, are at least equal to those of the ordinary apprentices, and as they exhibit superior habits of order and regularity in their conduct and in their occupation, they are much sought after by the masters.

The girls of the working home of Notre Dame de Caen, are received into the institution in their infancy and kept there for several years. They are trained to a great variety of different occupations (needlework of all kinds, mending washing, ironing, embroidery, and lace making), which, with the addition of proper instruction, develops their intelligence; they obtain on leaving daily salaries which amount to 1 fr. 50 c., with board, whilst the female apprentices trained in the ordinary way, being less skilful and less industrious, can only earn one franc a day without food.

Further details may be found in the reports of the Prefect of Calvados, which show that out of 29,551 young girls who left the schools in 1851, there were,—

17,243	brought up as seamstresses,
1,052	as lace makers,
3,581	as seamstresses and lace makers,

21,876

and that out of the 29,551 pupils there were 7,000 aged less than seven years.

It is not astonishing that a Department in which the municipal authorities and private liberality co-operate with so much zeal and intelligence in the intellectual and moral improvement of the population should be classed among those of the Empire in which public instruction is the most advanced.

AGRICULTURAL ORPHANAGES IN ALSACE.

Under the title of Sisters of the Cross (*Sœurs de la Croix*) some pious ladies belonging to an ancient family of Alsace, with no other resources than zeal and feelings of charity, have succeeded in founding three establishments, in which they bring up, board, and instruct more than 300 young girls taken from the lowest class of society, and fit them for situations as farm or domestic servants.

The children received in these establishments consist of three classes :

1. Children convicted of crime sent by the Ministry of the Interior, and for whom the State allows 50 centimes per day each during the period of their detention.

2. Children belonging to the Department abandoned by their parents, for each of whom 84 francs a year is allowed until the age of 12. After that period, and when they have taken their first communion a sum of 50 francs is granted for each child for her apprenticeship ; but the institution generally keeps them at its charge until the age of 21 years. Of this class there were 30 in 1864.

3. The daughters of poor or immoral parents, orphans, illegitimate children, and others sent by charitable persons constitute the third class. They are admitted gratuitously, and their number varies with the resources at the disposal of the institution. In 1864 there were 227.

The total of the three categories amounted in that year to 311.

The first attempts of these reformatory institutions date from the year 1838, when they were received with favour both by the public and by the Government. The latter granted subventions, the highest of which did not exceed 1,000 fr., and which have ceased since 1857. The only assistance it now receives is from small municipal grants.

Notwithstanding its limited resources the institution has increased. It has now three establishments, one at Neuhoof, near Strasburg, erected on an estate of 45 acres, which has cost 120,000 fr. ; the second at Schlestadt, in a house taken on lease ; the third, organized at Colmar, at the request of the prefect of the department, on an estate purchased at a price of 45,000 fr.

The young girls generally remain in these orphan institutions until the age of 21 years. In addition to primary and religious instruction they are taught needlework, knitting, washing, and ironing, and, above all, field labours, such as farming, kitchen gardening, and arboriculture. They are also instructed practically in the tending of cattle and poultry. In a word, they are trained in these establishments to become farm or domestic servants. On leaving, all the young girls easily obtain employment, and the number of demands for them often exceeds that of the young women who require places. At present this institution, which has rescued from misery and vice more than 300 young girls, is self-supporting without the aid of the Government.

NOTE III.

SCHOOLS ESTABLISHED IN WORKSHOPS.

PROFESSIONAL SCHOOL OF THE FACTORY OF GRAFFENSTADT.

(*Ecole Professionnelle de l'usine de Graffenstadt.*)

This school, founded by M. Renouard de Bussières, proprietor of large works for the construction of machinery at Graffenstadt,

near Strasburg, is intended to give to the children of the neighbouring villages, from which it draws its workmen, and to the children of the men employed in the factory itself, habits of order and morality, as well as the rudiments of instruction sufficient to enable them to follow their calling as workmen according to their intelligence and their capacity.

Extract from the School Regulations.

Every young man who applies to be admitted as apprentice in the factory must fulfil the following conditions :—

“ 1. Be 14 years of age.

“ 2. Prove by a certificate from the minister of his form of worship that he has taken his first communion.

“ 3. Furnish a certificate of good conduct, given by the local authority of one of the residences of his family.

“ The term of apprenticeship is from four to six years, during which the young men are bound to attend the classes at the school attached to the factory. After the first year those who have distinguished themselves by their application and progress may obtain, as an encouragement, a daily pay, which is graduated in the following manner :—

During the second year	-	-	50 c. to 75 c.
During the third year	-	-	1 fr.
During the fourth year	-	-	1 fr. 25 c.
During the fifth and sixth years	-	-	According to merit.

“ Experience having shown that the classes to be followed with success should not be entirely gratuitous, a deduction of one-tenth of the earnings of the young men is made on behalf of the school funds.

“ *Organization.*—This professional school is divided into five classes, the instruction in which is graduated from one to the other, and is confided to a single master, assisted by the manager and workmen of the factory.

“ The instruction comprises the following subjects :—Writing ; French grammar ; dictation ; composition ; free-hand, geometrical, and mechanical drawing ; arithmetic, up to logarithms and annuities inclusively ; complete elementary geometry ; algebra, as far as quadratic equations inclusively ; natural philosophy, including the theory of heat and sound ; mechanics, and simple machinery.

“ The classes are held every morning, from 6 to 8 o'clock, including Sundays, and every evening, from 5 to 7 o'clock, with the exception of Tuesdays and Sundays ; so that the three lower divisions have six hours' school-work per week, and the two superior divisions each eight hours. The five divisions unite in the drawing class.

“ The annexed table will show the distribution of the classes for the five divisions :—

	MORNING CLASSES, from 6 to 8 in Summer, and from 7 to 9 in Winter.			EVENING CLASSES from 5 to 7.	
	1st Class.	2nd Class.	3rd Class.	4th Class.	5th Class.
Monday	{ Arithmetic. French. }	—	—	—	{ Algebra. Geometry. }
Tuesday	—	{ Arithmetic. Geometry. }	—	{ Algebra. Geometry. }	—
Wednesday	—	—	{ Arithmetic. Geometry. }	—	—
Thursday	—	{ Writing. French. }	—	{ French. Drawing. }	{ French. Drawing. }
Friday	{ Geometry. Writing. }	—	—	—	{ Arithmetic. Mechanics. }
Saturday	—	—	{ Writing. French. }	{ Arithmetic. Natural Philosophy. }	{ — }
Sunday	Drawing.	Drawing.	Drawing.	Drawing.	Drawing.

“ *Evening Occupation.*—In order to give the young pupils during the winter season every opportunity of profitably employing their evenings, each of them is permitted, on making a request to the master, after the day’s labour, to sit in the school-room, which is lighted and warmed for that purpose. A small library of instructive and amusing books is placed there for the use of the pupils.

“ *Discipline.*—A report is sent in daily to the director of the factory, mentioning the absence of any of the pupils and such facts as require to be pointed out to the superior authority. “The punishments to which the pupils are liable are, according to the gravity of the fault, a reprimand from the director, fine, or exclusion from the factory.

“ *Monthly Examinations and Quarterly Statements.* *Yearly Examinations.*—Every month, in the afternoon of the Monday following the pay day of the workmen, in order to classify the pupils, an examination, partly vivâ voce and partly on paper; the latter consists of dictation, arithmetical problems, and geometry, and is set alternately in French and in German. The results of this competitive trial, of which a copy is communicated to the director, are entered in a register, in which are contained also the notes concerning each pupil. At the end of each quarter a letter is addressed to the parents of each pupil, giving an account of the conduct, industry, aptitude, and progress of their sons.

“These monthly examinations are completed by a general examination at the end of the year, of which a report is drawn up, and which takes place in the presence of a commission composed of the chief persons employed in the factory. After this final examination, a distribution of prizes, consisting of works of practical utility, takes place with all the ceremony which the resources of the establishment will permit.

“ *Number of Pupils.*—The number of pupils who now attend the five divisions is 70. Nearly 300 young men have passed through the different classes of this school since its foundation.

“Expenditure.”—The costs of the instruction are about 3,500 fr. or on an average 50 fr. each pupil per year.

“Results.”—Taking into consideration the backward state of instruction of the young men in general when they enter the school, there is reason to be satisfied with the results obtained since its formation, and with the advantages which accrue to the factory and to the working population.

“Those who, favoured by nature, are able to preserve above their fellow pupils the rank they gained in the first trials, generally obtain the chief places, not only in the workshop but in the counting-house also. The training they have received in the five classes is such that by means of study and the intimate relations of the pupils with the masters of the establishment, as well as with the students, both foreign and French, (who, on leaving the special schools, come to Graffenstadt to obtain a practical knowledge of their profession), they can themselves, without the aid of masters, improve and extend their knowledge. They find, in the pursuit of that object, great assistance in the library of the factory, which contains the principal scientific and technical works in French, German and English. All, moreover, in acquiring a degree of instruction proportioned to their capacity, derive from the lessons of the master, and from intercourse with their fellow pupils, those principles of order and morality in which consists the dignity of man.”

In reproducing verbatim the above details, furnished by the able manager of the factory of Graffenstadt, we cannot refrain from remarking that the school founded and supported by M. Renouard de Bussièrès offers a most remarkable example of the complete organization of a real and practical apprenticeship combined without inconvenience with the instruction necessary for the exercise of the profession in a large factory. The practice of piecework diminishes the inconvenience which the absence at the classes, sometimes for four hours a day, would cause in factories where the use of machinery and looms renders payment by the day expedient, and in which the presence of the apprentices is necessary to the master workmen. A similar arrangement is applicable to factories in which the work is divided and executed in the same manner, and in particular in the machine workshops, where there is such a great want of workmen possessing a certain degree of instruction combined with practical skill.

It will be remarked that in the school in question have been adopted,—

1. The principle of school fees.
2. The practice of regular monthly examinations, and a general examination at the end of the year followed by a distribution of prizes.
3. Punishments for breaches of discipline, which may go to the length of dismissal from the factory.

By means of this organization the establishment is enabled to recruit its staff of workmen with intelligent young men almost exclusively taken from among the local population.

This third mode of combining apprenticeship with technical instruction unites, as may be seen, the advantages of the rapid

production of the factory with those of the study of the principles which the workman requires to know, and at the same time exercises a beneficial moral influence on the youthful mind. It is therefore to be desired that the Government should by all the means at its disposal encourage and aid the formation of similar schools intended for the apprentices of the great industrial establishments.

SCHOOLS AT THE STEAMSHIP BUILDING WORKS OF LA CIOTAT.

(Ecoles des Ateliers des Messageries de la Ciotat.)

In addition to primary schools the Company of the Messageries Impériales has organized their system of apprentices on the following plan.

The children are generally not admitted into the workshops until the age of 13 ; rarely at 12, and never earlier. They are not subject to any menial service. From the date of their admission they receive a pay of 50 centimes per day, which is generally increased at the end of the first year to 1 fr. and even to 1 fr. 25 c. The average pay of all the apprentices is from 1 fr. 30 c. to 1 fr. 35 c.

All the apprentices aged less than 16 are bound to attend the school, which is directed by the Christian Brothers. The classes are held in the morning and afternoon during the first hour of the two halves of the working day. The day is of ten hours, divided into two portions of five hours each. The pupils are taught the usual course of primary instruction. Drawing classes are held during the evening ; apprentices somewhat advanced in the primary instruction are admitted to them. The lessons include drawing of machines, and steam engines, naval construction, and ornamental drawing. They are attended with much eagerness.

School of Female Apprentices.—This school is organized in a similar manner to that for boys ; it is directed by the Sisters of the Holy Name of Jesus. (*Sœurs du Saint-nom-de-Jésus.*)

The situations which the company can give to its most skilful workmen are those of engineers on board steamboats and foremen in the workshops ; the instruction which it liberally confers on them greatly aids it in obtaining efficient workmen.

SCHOOLS OF THE FACTORIES OF WESSERLING (HAUT-RHIN).

These establishments, which together form a sort of industrial colony at the opening of the beautiful valley of St. Amarin, employ about 6,000 workmen, from among a population of 20,000 souls, spread over several villages grouped around the principal centre. The proprietors of these large and magnificent factories have long interested themselves in the instruction of the workmen and their children, and with the co-operation of the mayors of the

neighbouring communes they have founded a number of schools, which provide for all the benefits of instruction in a degree proportioned to the position of the parents and the intelligence of the children.

At Wesserling itself the families of the masters and their principal assistants form a total of about 300 persons, whose children receive secondary or superior instruction. To prepare them for it there has been created, in addition to the primary school, an intermediate one, where the German and French languages are the principal objects of the studies, to which are added history, geography, and the rudiments of the mathematical and natural sciences, and a class for ornamental and mechanical drawing.

The education in this intermediate school lasts for four years. The children are admitted at from 10 to 12 years of age, and are all outdoor pupils. Their number varies from 40 to 50, and they undergo an annual examination.

To this establishment are also admitted, after a competitive examination, the most intelligent and laborious pupils of the neighbouring communal schools. Admission to this school is much sought after by the parents for their children, because the factory has for the last 30 years taken all its clerks from among the pupils. In order to diminish a little the number of applications, gratuitous instruction in it has been abolished, and a monthly payment of one franc is required. The annual cost of this school is from 5,000 francs to 6,000 francs.

A part of the pupils, after having followed the classes of the intermediate school until the age of 16 years, enter the workshops of the establishment as apprentices for three years, and those who are active and laborious receive wages; they then make the tour of France, and when they return they may become foremen. Drawing lessons are given in a special school, co-ordinately with those of the intermediate school and with the employment in the workshops. The pupils are taught engraving and the kind of drawing required by the local manufacturers. Most of the designers of the establishment are taken from this school.

The moral influence of this series of schools on the numerous population around the factory of Wesserling is such that public order has never been disturbed, even in times of civil troubles; and there is not, in the whole neighbourhood, a single instance of immoral cohabitation. Very strict principles were at the commencement enforced by the original founders of the establishment, of which their distinguished and respected sons are the present proprietors; whenever the priest came to inform them of any illegitimate union, the workman was dismissed unless he repaired his fault by marriage.

This satisfactory moral result, taken in connexion with that obtained by M. Bourcart at Guebwiller, shows how great and beneficial an influence the master manufacturers can obtain when they are induced by an enlightened and persevering philanthropy to direct with a firm and paternal hand the

working populations, whose prosperity and welfare depend on the success of their establishments.

NOTE IV.

ON THE PRESENT TENDENCY TO THE SUPPRESSION OF APPRENTICESHIP IN THE LARGE TOWNS.

The Commission, in directing its attention to the questions which are connected with apprenticeship, in relation to both practical and technical instruction, and in studying the modifications of which the law on the contract of apprenticeship appears to be susceptible, has not overlooked the fact that in the great centres of population, and in Paris in particular, the custom of taking and training apprentices, is gradually dying out.

Many masters and chiefs of workshops, to escape the obligations imposed by the law, and the control of the Councils of Prud'hommes (*Conseils de Prud'hommes*), instead of receiving apprentices take as workmen young men who have no knowledge whatever of the trade. They are first occupied as labourers, and by degrees, as by example and personal observation these young men obtain a knowledge of the trade, the masters increase their wages.

This system, which at once leads the apprentice to know the value of his labour from the wages he receives, and which excites his emulation by the hope of an increase of pay, presents in large workshops, where the work is well regulated, certain advantages, and may contribute to render apprenticeship more rapid. It is applied with success at Graffenstadt, Creuzot, and elsewhere. But in the very small workshops it is much less advantageous, as it leaves too much latitude to the absolute rule of the master, and to the caprice of the child or of his family. They are bound by no contract, and the boy after having passed from workshop to workshop runs the risk of not learning any trade at all. It must also be added that under these conditions the young workman loses the advantage—reserved to him by Article 10 of the law on apprenticeship—of having two hours daily at his disposal for his instruction, and it therefore becomes necessary to extend to him, if possible, according to his age, the conditions relative to the employment of children in manufactories.

Another tendency, still more serious, which we think right to mention here, because it is connected with the question of apprenticeship (although in a different point of view from that before the Commission), is the absolute prohibition to take apprentices which certain classes of workmen, by coalitions which have hitherto escaped the action of the law, impose on the masters. Already at Paris the working hatmakers, printers, and other classes of trades, under the pretext that there is an excess of hands, oppose, under pain of strike, the admission of apprentices into the workshops. The masters are thus obliged to compete

with each other to obtain the workmen they may require, and submit to the demands of those they may wish to keep. They have, it is true, the resource of appealing to the Departments, in which alone now apprentices are trained. But then the movement, already so great an evil, which takes from the provinces hands required for its different trades, would be still further increased. Besides, nothing would prevent the workmen from decreeing the exclusion of those who should come from the Departments, as the hatmakers already do to a certain extent. And if the silk weavers of Lyons, the tanners and brewers of Strasburg or Lille, &c. imitate this example, which may be advantageous to the present members of those associations, the system of trade corporations, the abolition of which was considered as one of the great benefits of 1789, would be re-established in a manner more tyrannical than ever. For not having the law and its interpreters as a check and as a support, it will only be able to maintain itself by force, which the men will not hesitate to employ. During past centuries the trade-corporations were organized and constituted with the sanction of the kings, and created for themselves monopolies under the specious pretext, perhaps then well founded, of a protection necessary to the development and maintenance of their trades. At present, abusing the principle of the liberty of trade, and the protection merited by the labourer, who pretends that he is oppressed and taken advantage of by the masters, the workmen are endeavouring to re-construct, with less consideration for the general welfare, and by a mere abuse of their number, the same corporations.¹

NOTE V.

DIFFERENT SYSTEMS OF PROFESSIONAL INSTRUCTION FOR WORKMEN.

The report of the committee charged in 1864 to visit the English schools contains some valuable information relative to some

¹ The statistics of the manufactures of Paris, drawn up by the Chamber of Commerce testify to these restrictions in the following terms (p. 248):—

“ The claims enforced by the working hatmakers consist principally in refusing to execute different works connected with their trade, in admitting apprentices to the workshops only under certain conditions, and in refusing to permit men from abroad or from the provinces to work unless accepted by themselves.

“ The masters declare that these pretensions originate from and are sustained by the powers assumed by a mutual aid society created by the working hatmakers. The manufacturers desire that this society should be confined within its former limits, when first instituted, and that measures should be adopted to prevent it from pressing in so prejudicial manner on the trade.”

At p. 246 the following facts are also stated :—

“ The working hatmakers employed in the factories remain idle, not only on the Monday, but on the Tuesday, and even on the Wednesday also. This voluntary suspension of work places them in a precarious situation, notwithstanding the high rate of wages.

“ A manufacturer estimates as follows the earnings of several men working by the piece:—One franc on Monday and Tuesday ; two francs on Wednesday ; four on Thursday ; five on Friday ; and fifteen on Saturday—pay day.”

of the establishments intended for the instruction of the working classes. We have added a few supplementary details, which show how the mechanics' institutes of our neighbours have been adapted to the different conditions of their industry.

BIRMINGHAM MIDLAND INSTITUTE.

This institute is divided into two sections ;—one the general department, comprising, 1, reading rooms, provided with journals and periodicals ; 2, a library and museum ; 3, a hall for lectures on literary and scientific subjects, adapted to persons placed by their means and social position above the working classes ;—the other, called the industrial department, is the real institute destined for workmen, for whom there are classes.

The general principle of the institution, as of all those of a similar nature, is the payment of a subscription ; but that of the members of the first section being one guinea a year, while for the second the admission to a class is only 3s., or for the whole of the classes 9s., the result is that the receipts of the former assist those of the latter, and the financial prosperity of the institution is thus secured.

There are classes of natural philosophy, chemistry, elementary mathematics, English literature, the living languages, botany, &c. Examinations, after which certificates are delivered, are held and maintain a valuable emulation.

GLASGOW MECHANICS' INSTITUTE.

To complete the proofs of the necessity and influence of the diffusion of primary instruction, on which depends the success of the technical education to be given to the working classes, we will borrow from the report of MM. Marguerin and Mothéré the following details of the Mechanics' Institute of Glasgow, which, founded in 1800 by Dr. Birkbeck, has served as a model for all the similar establishments since created :—

“ At Glasgow there has been no necessity for indirect means to assure the success of the evening classes ; there are no lectures for the superior classes, giving them, as at Birmingham, an opportunity of aiding in the instruction of the workman ; no games and refreshments, as at Manchester, to draw the young men by attractions unconnected with education ; a general library of more than 6,700 volumes, with scientific and other periodicals, is all that the institution possesses in addition to the classes. The reason for this superiority is explained as follows : The working classes being better educated, are more able to appreciate the advantages of a superior instruction ; the teaching of the mechanics' institutes has not been, as in England, above their capacity.”

The classes of this institute comprise the following subjects :—

	Lessons per week.
Chemistry applied to agriculture and manufactures	1
Experimental natural philosophy	1

2. By improving the mode of working, to render the competition with foreign manufacturers less difficult ; and

3. To improve the morality of the workmen by instructing them.

Rightly judging that oral instruction addressed to a numerous audience, however lucid it may be, leaves few traces when not accompanied by practical application, and that to avoid ruffling the self-respect of workmen, it is necessary to separate them from apprentices, while leaving them a liberty and an independence in their studies which flatters them, he has endeavoured to engage workmen to meet and associate in groups, forming kinds of circles or clubs, all the members of which study the same subjects. The first circle formed devoted the whole of its attention to singing ; but others were soon constituted for the study of English, of French, of arithmetic, and of geometrical drawing.

Admission into these circles and exclusion therefrom is decided by the vote of the members. The monthly subscription is 10 c., and the proceeds are employed to defray the general expenses and the purchase of ink, pens, pencils, paper, &c. Every person who absents himself without sufficient cause is liable to a fine of 20 c. in virtue of a rule adopted by the members themselves. The fines and subscriptions are collected by the commissioners (*commissaires*) of each circle, who are elected by the members. The number of members admitted to the circles is now 500, out of a working population of 6,000.

The costs of first establishment, paid by M. Bourcart and the other founders who have joined him in the work, amount to the following sums :—

	Fr.
School buildings - - -	14,000
Librarian's house - - -	4,500
Ground, garden, and enclosure -	17,000
Gas, firing, furniture, and imple- ments - - - - -	8,000
Library - - - - -	6,000
Cost of maintenance for six years -	10,000
Total -	<u>59,500</u>

The organization of these classes at first encountered some difficulties on the part of the Minister of Public Instruction. Although the regulations proposed were accepted by the Prefect, the Rector of the Academy obliged M. Bourcart, who had no academic degree, to find a duly qualified director for the establishment, who was formally registered as its head, and the real founder was thus prevented from giving his name to his own foundation. After existing for six years, the academic authorization being still withheld, the classes were continued only on sufferance. But it is just to add that in the summer of 1864, when the Minister of Public Instruction made a tour of inspection in the Haut-Rhin, for the purpose of ascertaining the state of professional

education in Alsace, he at once removed all these difficulties. However, this instance sufficiently demonstrates the importance of withdrawing all foundations of this kind from the action of the university regulations, which are only applicable to a totally different order of instruction.

The statutes and regulations of the institution have been drawn up with the twofold object of leaving the workmen who wish to avail themselves of the instruction given all the liberty and independence they can desire for holding their meetings, and of leaving the founders sufficient authority to provide for the general management of the undertaking and to secure the observance of public order. These documents may be profitably studied by those who think of founding similar institutions, and for that reason they are here given in full, accompanied by the programme of the classes for the year 1863-64.

Statutes of the Popular Schools of Guebwiller.

The opening of the school-house prepared for the meetings was authorized by the prefect of the Haut-Rhin on the 28th November 1858, under the following conditions :—

ARTICLE 1. The school-house is open on Sundays and on holydays from one o'clock in the afternoon till ten at night, and on working days from seven till ten at night.

ART. 2. The school shall close at ten o'clock precisely. All discussion on political or religious subjects, or any other that might disturb the good understanding of the members is strictly prohibited. It is likewise forbidden to introduce newspapers or political publications, cards or other instruments of gaming, wine, or food.

ART. 3. To all those who engage to submit to the statutes proper means shall be supplied to promote their intellectual and moral development, such as lessons in singing, reading, and calligraphy, French, and arithmetic; also lectures on history, geography, religion, morals, &c., as may be found desirable.

ART. 4. All persons aged sixteen and upwards are admissible, without distinction, on condition that they be regularly inscribed, and promise, 1, to avail themselves assiduously of the advantages offered; 2, to avoid, while on the premises, everything contrary to the statutes and to propriety; 3, to be careful not to injure the premises, the books of the library, or other things entrusted to them; 4, also to avoid, in their conduct elsewhere, everything calculated to give just cause for scandal.

ART. 5. The number of persons present at one time must not exceed 150.

ART. 6. No change can be made in the regulations without the assent of the superior authorities.

The Institution,—its object, means, and organization.

ARTICLE 1. The institution shall be known by the title of *The Guebwiller Popular Library and Classes.*

ART. 2. Its object, as above stated, is to afford every young man, and especially the laborious workman, desirous of instruction, the means of developing his intellect and his heart, and of providing him with praiseworthy occupations and recreations.

ART. 3. These means are, the forming and maintaining of a library, subscription to other libraries, professional classes, lessons in singing, history, morals, &c.

ART. 4. It is supported by donations and loans, and by the proceeds of the subscriptions and fines of those who profit by the advantages offered.

ART. 5. It is subdivided into sections, each composed of the pupils attending the same class.

ART. 6. It is directed by a managing committee. The instruction is given under the responsibility of a director of instruction.

ART. 7. It is under the supervision of a supreme patron.

Sections, Professors.

ART. 8. Every subject taught or professed forms a class (*cours*).

ART. 9. The classes are gratuitous.

ART. 10. The members of the same class form a section of themselves, with regulations adapted to their peculiar requirements; they vote their contributions, but always subject to the control of the managing committee. They are bound to punctual attendance at the classes.

ART. 11. The professors are either gratuitous or paid. The gratuitous professors are entitled to attend the meetings of the managing committee, but without a deliberative voice; they may be elected members of the said committee; they have the right to be present at all the classes. The paid professors cannot form part of the managing committee, nor can they be present at its deliberations.

ART. 12. All the professors, without distinction, have the right to use the library, in conformity with the rules. The professors are bound to present their general programme to the director of the instruction before commencing their courses.

Formation of a Section.—Admission.

ART. 13. The first ten members of a class are admitted by the managing committee, who act as commissioners of the class until the number of ten members has been reached.

ART. 14. As soon as the class contains ten members, it forms a section which appoints its commissioners in conformity with the regulation hereafter given. This section may cease to exist, and fall back into its first condition, if it decline to less than ten members, and if the managing committee so decide.

ART. 15. Every person who desires admission into the society must be nominated and recommended by one of its members. The commissioners of the class he wishes to join will decide on his admissibility. In case of a favourable decision, a ballot

will take place, and the candidate will only be definitely admitted when he obtains a majority of votes among the members of the class he wishes to attend. It is strictly forbidden to take the candidate's religion into consideration. By the fact of his admission the new member is subject to the provisions of the existing statutes as well as to the special regulations and to the monthly payments of the section to which he belongs. A person already admitted into one section may join another, provided he conform to the rules of the new section and be accepted by its commissioners.

Administration of the Sections.

ART. 16. Each section is represented and superintended by a committee of five members, composed of the professor of the class, who is a permanent member, and of four commissioners selected from the members of the class by a majority of votes. The commissioners are chosen from among the members who shall have offered themselves as candidates or have been nominated for the office by the director or by five members, and whose names shall have been posted in the hall for a fortnight at least. When no candidate shall have obtained an absolute majority of votes there shall be a ballot between the two members who have received the highest number.

ART. 17. At the end of every quarter one of the four members elected shall retire, but he may be re-elected. For the first three quarters the members retire by alphabetical order, afterwards by seniority.

The Commissioners.

ART. 18. At the commencement of every quarter, and immediately after the election, the commissioners choose a president from among their number, and also a secretary and a collector; these are always eligible for re-election. The name of the president is transmitted to the local authorities by the secretary.

ART. 19. The president of the commissioners convokes the committee and the section whenever he thinks proper. The section is convoked at least once in every quarter. The president of the committee takes the chair at the meetings of the section, and he has the casting vote when the numbers are equal. The secretary draws up the minutes of the meeting, which are signed by him and by the chairman. The collector receives the monthly payments and the admission fees; he makes the payments authorized by the committee and presents his accounts to the section at the end of each quarter, and to the managing committee whenever required.

ART. 20. The commissioners are charged with enforcing the regulations and with all measures of discipline. They are responsible to the directors and to the patron for the preservation of the premises and to the local authority for all infractions of the police laws.

Funds of the Society.

ART. 21. Each section has its own particular fund, which is maintained by the monthly subscriptions and by the fees each member has to pay on admission. The whole fund is deposited with the cashier of the management. This common fund is intended, 1, to cover the expenditure each section may have to make ; 2, to guarantee the establishment against the loss or deterioration of the books or other articles entrusted to the members ; 3, to assist sick or necessitous members ; 4, to pay the expense of fêtes or excursions which the committee may have authorized.

ART. 22. The expenses, except in case of guarantee for loss or deterioration of books or other articles, are voted by the commissioners ; they can never absorb more than two-thirds of the whole sum in hand.

ART. 23. The members who resign or are excluded lose all claim on the common fund.

ART. 24. No money can ever be divided among the members. The funds in general shall be, as far as possible, paid provisionally into the savings bank, or into a bank selected by the donors and founders at a general meeting on the motion of the patron, to be converted into government bonds or stock, or invested in mortgages yielding good interest, and for a stipulated use.

Rights and Duties of Members.

ART. 25. Each member has the right ; 1, of using the books in the library on the premises, and even of taking home one or two volumes, on making application to the librarian and signing his name ; 2, of taking part in the fêtes and excursions duly authorized.

ART. 26. The members are bound ; 1, to be punctual in their attendance at the lessons to which they are admitted and at the meetings convoked by the competent committees ; 2, to contribute to the mutual aid fund, chiefly in case of sickness ; 3, to attend the funeral of a deceased fellow member ; 4, to scrupulously observe the existing statutes, as well as the special regulations of the section to which they belong ; 5, to be always well conducted, both on the premises and elsewhere ; 6, to avoid all language and expressions offensive to a fellow member.

Penalties.

ART. 27. The penalties for offences against the discipline of the society are ; 1, the call to order ; 2, the reprimand, involving the disability of being elected commissioner for a certain term not exceeding one year ; 3, exclusion from the section, or even from the society.

ART. 28. The call to order is pronounced by the chairman of the committee. The reprimand and prohibition from becoming member of a committee are pronounced by the managing

committee at the instance of the sectional committee, taken by a majority of votes in a ballot, or on the motion of the patron. Exclusions in general, whether from the committee or from the society, are decided by a vote taken in the same form as for admission, that is, they are pronounced after a ballot by the committee, or by the section of the member whose exclusion is demanded; it is only in case of urgency that exclusion is pronounced by the patron. The penalties against a commissioner are pronounced by the chairman of the managing committee, or, according to the gravity of the case, by the managing committee. Every member who, on account of a penalty, by reason of a dispute, or for any other motive connected with the institution, should take legal proceedings against a member or any official whatever, instead of abiding by the decision of the patron or managing committee, would *ipso facto* cease to form part of the society.

The Management.

ART. 29. The institution is administered and directed by a managing committee composed of five members subject to election, and of the librarian,* who is a member *de jure*.

ART. 30. The five members subject to election are chosen from a list of candidates approved by the patron, and comprising at least double the number of members to be elected, which must be posted up a fortnight before the election in the hall of the library.

ART. 31. The election is made by the commissioners and professors of all the sections, by ballot, and the majority must be more than one half of the voters. In case no one attains this majority there must be a second ballot between the two candidates who have obtained the highest numbers.

ART. 32. The managing committee is renewed by one-third (two, two, and one) every year. The first retiring members are designated by lot, and afterwards by seniority. The retiring members are eligible for re-election.

ART. 33. The managing committee names every year, among the five elected members, a president, secretary, and treasurer. The name of the president elect is transmitted to the local authorities by the secretary.

ART. 34. The managing committee cannot hold valid deliberations unless four members are present. Its decisions are taken by a majority, by ballot if demanded by two members; when votes are equally divided, the president has the casting vote.

ART. 35. The duties of the managing committee are more especially to see that the institution is not diverted from its proper objects, and to promote its development; to choose the director of the instruction and the professors; to regulate the programme of the courses; to enforce the strict observance of the statutes and to warn the members who infringe them; to superintend the library and the selection of books; to attend to the purchase of books, to subscriptions, &c.; to see that the premises

are kept in good repair, properly lighted and warmed ; to fix the fees and monthly payments on the motion of the committee ; to fix the salaries, to vote the expenses, &c. ; to accept donations and loans made to the institution.

ART. 36. The managing committee inflicts punishments for offences against discipline according to circumstances. It can pronounce the dissolution of a section, but only with the approbation of the patron. It represents the society in all its relations with the authorities and the patron, and reciprocally these communicate with the society through the managing committee.

ART. 37. The president convokes the managing committee at least once every quarter. With the consent of the committee he calls meetings of the commissioners presiding over sections, also of the sections and of their committees, when he thinks proper.

The secretary draws up the minutes ; he keeps all the correspondence, and every year presents a statistical report to the directors on the progress of the institution, and the results obtained. This report is printed and distributed to the donors.

The treasurer receives all the payments and discharges all the debts of the institution. He also presents a balance sheet to the managing committee once a quarter. He is responsible for all the sums paid into his hands.

The librarian takes care of the library and of the premises. He is charged, on his own responsibility as defined by the regulations, with the lending and recovery of the books borrowed by members of the society, or by persons unconnected with the society, if lending to the latter be authorized by the managing committee. He keeps the catalogue of the books.

ART. 38. The members of the managing committee have the right, without paying, to attend all courses given on the premises, and enjoy all the advantages offered by the institution.

The Director of Instruction.

ART. 38 *bis*.—The director of instruction must be a layman, and holder of the diplomas prescribed by law for the heads of independent educational establishments ; he is responsible to the university and to the patron¹ ; he is appointed by the management, receives a salary, and may be changed every year ; he superintends the teaching, and is responsible for its being in accordance with the programmes given by the professors ; he presides over the quarterly and annual examinations, and reports to the patron the names of the pupils who have merited prizes or a certificate of studies, according to the rewards offered by the managing committee. The mode of competition shall be regulated by a general meeting of the professors, with the director of instruction as chairman.

The Patron.

ART. 39. The institution is superintended by a supreme patron appointed by the founders.

¹ This condition, which was imposed by the Ministry of Public Instruction, is contrary to the principles admitted by the Commission.

ART. 40. The patron represents the whole body of founders and donors ; he is chosen and displaced by them at a general meeting.

ART. 41. He is responsible to the public authorities and to the donors and founders, and for this reason he is entitled to be present at all the meetings and sittings of the managing committee, of the committees of societies, of the societies themselves, and even to call meetings by his own authority, to receive reports of all the decisions that shall be taken, and to suspend or hinder their execution, to make any propositions whatever, and to oppose those made, to take at once all measures that may appear to him urgent, but with subsequent reference to the managing committee (in case of opposition on the part of this body it may be dissolved, and new elections at once made ; if the same members are re-elected the extraordinary measure taken is to be cancelled) ; to propose the exclusion of a member or the dissolution of a section or of a committee.

ART. 42. Extraordinary expenditure cannot be made without the approbation of the patron. All questions not provided for or determined by these statutes shall be decided by the patron.

Gifts and Loans.—Founders and Donors.

ART. 43. Donations in favour of the institution may be made in money, moveables, or real estate.

Loans can only be made of moveables or fixtures without hire or rent. The owners of articles lent may withdraw them at pleasure, by giving the managing committee one month's notice beforehand and on returning the receipt which was given them at the time of the loan.

ART. 44. The title of founder is given to any person who makes to the society a donation of at least 3,000 fr., paid down, or who shall have acted as professor gratuitously for at least ten years.

ART. 45. The title of donor is given for a year to any person who makes a donation of 50 fr. at least, or to any professor giving a gratuitous course :—for twenty years to a person who makes at once or at several times a donation of at least 500 fr. ; to any one who makes a loan worth 500 fr. ; or to any professor who has given a course for two years gratuitously.

ART. 45 *bis*. Every founder or donor has the right to avail himself gratuitously of all the advantages offered by the institution, and to be present at the meetings of the members. The founders alone have the further right of attending the meetings of the directors and of the commissioners, but without deliberative voice.

The founders and donors are convoked in general meeting by the patron, at least once a year, at the school-house ; they may also meet extraordinarily during the course of the year, at the special demand of three founders at least, and with due notice. The patron is invited to all extraordinary meetings.

The meetings of founders and donors are presided over by one of their number, assisted by two members, all three elected at the opening of the sitting, which is usually presided over by the founder who has contributed the largest sum.

The patron presents to the meeting of founders and donors a general report on the situation and progress, on the financial state of the institution, and generally on all matters of interest to the founders and donors.

The founders and donors shall have the right to discuss the patron's management, and shall express their approbation or disapprobation by a vote. The patron may be deposed from his functions by a new vote on the written demand of three founders.

If necessary, the banker shall be designated at these meetings on the proposition of the patron.

The dissolution of the society, if it does not attain its object, or has deviated therefrom, may be pronounced on the proposition signed and justified of three founders or of nine donors.

The founders and donors can deliberate only with a quorum consisting of at least one more than the half of their whole number, and representing at least two-thirds of the total amount of donations and loans; in default of this condition a second meeting shall be called a week later.

The decisions are taken by a majority of the votes of the members present. The votes of founders are counted at the rate of one per 1,000 francs, or fraction of 1,000 francs amounting to 500 francs over the first thousand, but no founder or donor is to have above five votes, whatever the total of his donations.

ART. 46. In case of the institution coming to an end, all the funds in hand, after paying the expenses and the cost of all the moveables belonging thereto, are divided among the founders and donors in proportion to the sum contributed by them; all articles lent, as well as inalienable capital, shall be returned to their owners.

Modifications of the Statutes.

ART. 47. The present statutes are binding on the members without distinction.

ART. 48. No changes can be made therein except on the proposition, written, signed and posted up, either of two members of each section, or of three members of the committee, or of two members of the managing committee, or of the patron.

ART. 49. The decision respecting any modification shall be made by a majority of votes, dependent on the approbation of the patron, in a meeting composed of the managing committee and of the different sections represented by their presiding commissioners. Each section shall have one vote. Each member of the managing committee shall also have one vote.

Regulations.

ART. 50. Besides the present statutes common to all members, the pupils of each class vote their own regulations as to order,

entrance fees, and monthly payments, formalities of admission, &c., according to the peculiar requirements of the section; the whole subject to the approbation of the managing committee, which may make any changes deemed indispensable.

The regulations can never contain any provision contrary to the general statutes.

ART. 51. No meeting must exceed the number of 500 persons.

ART. 52. No modification can be made in the statutes without the assent of the superior authorities. "

(Signed) J. J. BOURCART.

Programme of the School Year 1863-64.

Days and Hours.	Courses.	Professors.
		Messrs.
Sunday morning at 8 o'clock	Literature - - -	Wirth.
Sunday " 11 " -	Geometrical drawing -	Ulmer, junior.
Sunday " 11 " -	Free-hand drawing -	Ch. Bourcart.
Sunday - - - - -	Gardening - - -	Biehler.
Sunday - - - - -	Botany - - -	Maeder.
Monday evening 8 " -	Elementary Arithmetic	Delunsch.
Monday " 8 " -	Mechanics - - -	Franger.
Tuesday " 8 " -	Geometry - - -	Lecocq.
Tuesday " 8 " -	English language -	Marx.
Wednesday " 8 " -	French language -	Gasser.
Wednesday " 8 " -	Book-keeping - -	Rieder.
Thursday " 8 " -	Algebra - - -	Delunsch.
Thursday " 8 " -	Arbitration - - -	Rieder.
Friday " 8 " -	Geography - - -	Rieder.
Friday " 8 " -	Geometrical drawing -	Ulmer, junior.
Saturday " 8 " -	History - - -	Dock.
Saturday " 8 " -	Sol fa - - -	Brumpt
	Singing - - -	Brumpt.
	Hygienics - - -	Durrwell.
	Physics, Chemistry -	Franger and De Bary.

(Signed) P. G. GRENIER,

Director of Instruction.

The opening of the courses takes place in the first fortnight of October 1863.

To be admitted to the courses candidates must enter their names with the librarian for the courses they wish to attend, and to make themselves acquainted with the statutes.

No candidates admitted under 16 years of age.

General Moral Influence.

Although the Guebwiller courses were opened no longer ago than 1858, they have already exercised a very manifest influence on the rising generation and the working population.

The workmen who attend these courses, instead of frequenting beer houses, and there losing their time, health, and money, now economize and improve their position by earning higher wages. The mere fact of attending these popular lectures is a recommendation. The home reading of the books lent by the library diffuses a taste for study and innocent amusements.

There are now from 400 to 500 pupils on the books, and some of them live in neighbouring villages; they come to school in parties of from 10 to 20 persons.

PROJECT OF A SOCIETY FOR POPULAR EDUCATION AT MULHOUSE.

Ever eager to receive and examine suggestions which may contribute to the instruction and improvement of the position of working men, the Industrial Society of Mulhouse appointed a special commission, with Dr. Pénot as reporter, to study the organization of the Guebwiller schools, and to prepare a project for extending the same benefits to the working population of Mulhouse. This report, drawn up in the name of the Committee of Public Utility, on the 30th of March 1864, recommended a scheme which contains the following statutes for the constitution of a society for popular education.

Statutes of the Society for Popular Education at Mulhouse.

1. A society for popular education is established at Mulhouse, having for its object to organize for the benefit of adults aged 18 at least, lessons in

Reading and writing ;
 The French language ;
 The German language ;
 The English language ;
 Elementary arithmetic ;
 Arithmetic applied to trade and manufactures ;
 Geometrical drawing.

The French, English, and German lessons will be altogether practical, and are intended solely to enable the pupils to understand and speak those languages in the shortest time possible.

Other branches of study will be subsequently added whenever the superintending committee, mentioned in Art. 16, shall think proper.

2. The pupils under one and the same master, for a single branch of study, constitute a course.

For the opening of a course there must be at least 20 pupils. The maximum of pupils for each course is fixed at 40, except for drawing, to which 50 may be admitted.

3. When one course shall have been organized for any branch of study, one or several others may be opened for the same in proportion to the number of candidates and the resources of the society.

4. These different courses shall be opened in divers quarters of the town, so that pupils may not have far to go.

5. The drawing lessons shall be given on Sunday, and shall have a length of two hours. The superintending committee shall so fix the hours for the lessons as not to prevent the pupils from attending to their religious duties.

At every drawing lesson the first half hour shall be employed by the master in imparting a practical knowledge of elementary geometry ; the pupils shall draw for an hour and a half.

All the other lessons shall be given between eight and nine in the evening, viz.,—

Reading and writing, three times a week.

French, three times a week.

German, three times a week.

English, three times a week.

Elementary arithmetic, twice a week.

Arithmetic applied to business, once a week.

The superintending committee shall fix the particular days for each kind of lessons.

6. The monthly payment to be made by each pupil is 20 c. for lessons in reading and writing, French, elementary and applied arithmetic ; for drawing 50 c. ; and 2 fr. for English and German lessons.

The monthly payment for any course may be increased by the superintending committee at the instance of a majority of the pupils.

The committee shall also fix the special payments for each new branch of instruction that may be added hereafter.

The pupils of a course shall have power to settle among themselves the amount of fines to be levied for late attendance or absence without some good cause. The cases for the infliction of fines, and the amount, must be authorized by the superintending committee.

7. All sums thus levied are to be employed in purchasing school necessities, such as the paper, pens, ink, pencils, &c., required for the pupils in school hours, except for the German and English courses, the professors of which shall be paid from this fund.

In this respect the superintending committee shall have the right to put certain new courses on the same footing as those of German and English.

The superintending committee supplies the drawing class, in the first instance, with compasses, drawing pens, boards, rulers, and other necessities.

8. To secure the maintenance of discipline in each course, commissioners are elected by the pupils from among themselves, in number one for every 10. If after dividing the number of pupils by 10, the remainder exceeds five, another commissioner shall be elected for them.

The whole class joins in the vote for each commissioner. The voting takes place previously to a lesson, notice having been given beforehand by the professor.

9. The commissioners are named for a year, and are always re-eligible. However, those who form part of the superintending committee retain their office without being subject to a new vote so long as their functions in the committee have not expired.

10. The commissioners keep order in the class. They inquire into the assiduity of the pupils; they receive the monthly subscriptions, and levy the fines.

Whenever necessary they meet as a committee, presided over by the professor, who is a commissioner *de jure* and has the casting vote in case of an equal division.

These meetings are held at the end of a lesson after the pupils have retired.

The professor immediately communicates with the director of the studies, mentioned in Article 14, whatever decision may be taken at these meetings. If the director considers the decision contrary to the interests of the course or to good order, he at once informs the superintending committee.

11. The funds of every kind raised by each course are immediately deposited, by a commissioner appointed for the purpose by his colleagues, in the hands of the director of instruction, who gives a receipt. The same commissioner goes to the director to receive the sum intended for the expenditure regularly voted out of the funds of the class, and for this he likewise gives to the director a receipt for his discharge.

There shall be kept in each class by the same commissioner an account of receipts and expenditure.

The director, on his side, shall keep a general account of all the classes, which shall serve as a controlling account for each of them. He shall be responsible to the superintending committee.

12. A class consists, in the first place, of the first twenty candidates inscribed, unless the director, to whom they must apply, has received unfavourable information respecting one or more of them, whose names in that case he strikes out.

Any person afterwards wishing to be admitted into a class makes the requisite application to one of the commissioners, who, after ascertaining the good character of the applicant, reports to the class, and the question of admission is put to the vote.

If, however, the applicant already belongs to another class, the commissioners of the class he wishes to enter decide alone on his admission.

13. As a complement to the classes a popular library is formed, which shall be open to the public on the days and at the hours fixed by the superintending committee.

Discussion on religious or political questions is strictly forbidden in the class rooms and the library.

14. A director is appointed who is responsible to the university for the instruction given in the various classes.*

The director watches over the instruction and sees to the maintenance of order in all the class-rooms and reading rooms.

* This obligation would have to be modified in other organizations, in conformity with the decisions of the Commission.

Every month he gives in to the superintending committee a report on the state of each class.

In case of any serious occurrence he immediately sends a report to the mayor of Mulhouse, who takes a decision with or without the advice of the council, as the case may be.

The director is at the same time intrusted with the care of the library. An assistant may be given to him for this part of his duties.

15. A pupil may be expelled from a class if he causes a disturbance in it, or if he absents himself too frequently without a legitimate reason.

His expulsion, whether temporary or permanent, is pronounced by the majority of the class.

The teacher however has the right to send a pupil out immediately for disorder in class. The class afterwards decides, at the end of the lesson, whether the pupil who has been sent out shall be recalled for the following lesson, with or without fine, or whether he shall be punished with temporary exclusion, which may not exceed three lessons, or whether his exclusion shall be permanent.

The committee of inspection has also the right to expel any pupil of whom unfavourable information has been received.

16. A superintending committee is intrusted with the general management of the Society of Popular Education. It is composed of the mayor of Mulhouse or a deputy appointed by him, who is chairman, four members named by the mayor, four members nominated by the Industrial Society, and four members chosen by the committee from a double list drawn up by the commissioners of all the classes and taken from among them.

The director of instruction and the teachers take part in the drawing up of this list, but are not eligible.

17. Till the classes are organized and the commissioners have drawn up the above-mentioned list, the committee shall add to its number, for one year only, four members from a committee recently formed at Mulhouse, which also has popular education for its object.

At the end of the first year the commissioners of the classes shall be called on to present their list.

18. The decisions of the committee shall not take effect unless there be at least nine members present as the time of voting.

19. With the exception of the mayor of Mulhouse or his deputy, the chairman *ex officio*, one half of the committee is renewed every year. For this purpose it shall be decided by lot at the end of the first year which shall be the two members of each class to be replaced.

All the members are re-eligible without limit.

20. The director of instruction may be called on to be present at the deliberations of the committee when his presence is deemed advisable. He has no deliberative voice.

21. The mayor of Mulhouse appoints and deposes the director and the teachers on the motion of the committee.

22. The committee is entrusted with the regulation of all the administrative details of the society, such as the choice and the appropriation of premises, the fixing of the days for lessons, &c.

The committee fixes the salaries of the director, the teachers, and the assistant librarian.

It decides, if necessary, on the creation of new classes, and, when expedient, on adding new subjects of instruction.

It may lower the age of admission to the classes to 16.

It issues regulations for the library, and if it sees fit proposes to the mayor an assistant librarian.

It collects the subscriptions necessary for the proper management of the society, and regulates and watches over the employment of the money.

It appoints from among its members a secretary, an assistant-secretary, a treasurer, and inspectors, who share amongst them the supervision of the instruction.

Every year the committee presents to the municipal authority and to the Industrial Society a report of the transactions of the Society of Popular Education.

23. The committee fixes the days for its ordinary meetings. It may also be called together extraordinarily by its chairman in urgent cases.

24. The present statutes shall be submitted for approval to the superior authority. This obtained, the mayor of Mulhouse and the manufacturers are requested to have them struck up about the town and in the workshops.

25. No modification may be introduced into them without the assent of the superior authority.

Observation. In this scheme for the organization of a *Society of Popular Education* there is no mention of special classes for young girls and women. This omission is to be deplored. It is true that as all the classes that the society purposes creating are to be held in the evening, it was thought that prudence did not allow of any being opened at such hours for young girls, and that the Sunday classes and the workshops that they may frequent in broad daylight, ought to suffice for their instruction. There is ground, however, for thinking that the Industrial Society, while adhering to the same rules of prudence, will endeavour to organize the classes of these workshops in such a manner as to give to them the development necessary for the commercial and industrial instruction of young girls and women.

The report just quoted terminates by proposing that the Industrial Society should re-establish the literary and scientific lectures which were successfully commenced 30 years ago, varying, however, the subjects of the lectures more than then was possible.

"Then," says the report, "the city of Mulhouse would possess a system of educational establishments of every degree: infant schools, primary schools, adult schools; a school for drawing, one for weaving, one for spinning; a Hebrew school of arts and trades, a professional school, a college, an upper school for the applied sciences, public classes and popular library, literary and scientific lectures; all founded and kept up on their own resources with-

“out any help from the State other than a purely moral co-
“operation.”

It is easy to understand that an industrial society which makes such efforts, which has created a workmen's home (*cité ouvrière*) that may stand as a model, is justly proud of the success that has attended its efforts, and that it is desirous of maintaining for the organization of all its charitable and philanthropical institutions an independence of which it knows how to make so wise and so salutary a use.

When our other manufacturing cities and our large centres of commercial and maritime population shall enter upon the same path, the solution of the great problem of decentralization will have made a great stride onwards.

The popular classes which the Mulhouse Society proposed to organize were, in fact, opened in 1864, and the results of the first year were sufficiently satisfactory to allow of their being appended to the information which precedes.

State of the Mulhouse Popular Classes in 1864-65.

The classes were opened on the 15th of October 1864, and the number of subscribers attending them is indicated in the following summary :—

Reading and writing	421
French	88
English	84
Elementary arithmetic	292
Applied arithmetic	70
Geometrical drawing	140
	1,095

A German class which had been announced was not opened for want of subscribers, as almost every one at Mulhouse speaks that language more or less.

The number having from the beginning exceeded anticipation, it was found necessary to divide certain classes, so that instead of nine the following were opened :—

Reading and writing	6
French	1
Elementary arithmetic	3
Applied arithmetic	1
Mechanical drawing	2
English (Robertson's method)	2
	15 classes.

By classing according to their trades the 1,095 pupils who were inscribed in the course of the first year, we obtain the following table :—

SUBJECTS TAUGHT.

Professions.	Reading and Writing.	French.	English.	Elementary Arithmetic.	Applied Arithmetic.	Drawing.	Total.
Metal workers - -	123	28	6	109	38	81	385
Spinners and weavers -	112	12	3	93	4	6	236
Carpenters and joiners -	47	11	1	25	5	25	114
Masons and stone cutters	21	1	—	9	2	7	40
Day labourers - -	29	4	—	21	1	2	57
Commercial employés -	—	7	54	—	5	4	70
Various - - -	83	25	20	35	15	15	193
	421	88	84	292	70	140	1,095

With respect to age, the pupils are distributed as follows :—

From 15 to 25 - -	291	65	75	214	61	118	824
From 25 to 35 - -	109	22	9	71	7	20	238
Above 35 - - -	21	1	—	7	2	2	33
	421	88	84	292	70	140	1,095

The teaching of French and of arithmetic gave very satisfactory results.

The order, discipline, and regularity maintained by the commissioners, elected by the pupils themselves, were so perfect that out of 15 classes and 1,095 pupils there was inflicted during the whole session only one fine of 20 centimes. The produce of the pupils' payments was employed by the same commissioners with so much economy that after all the class rooms had been provided with the necessary teaching materials, there remained a sum of about 300 francs, which the pupils sent to the mayor to be applied to charitable purposes.

Library.—The works composing this library are chosen with the greatest care. The number of readers who took out books amounted to 1,979, of whom 771 asked for French works and 1,208 for German works. Among these readers there are soldiers belonging to the garrison, who take out books to be read aloud in their rooms.

The total number of books thus put into circulation amounted during the year to 47,082.

The total expenditure for the popular classes and the library was 11,158 fr. 25 c., distributed as follows :—

	Fr.	c.
Salaries of director, librarian, teachers	6,171	00
Necessary materials, establishment expenses, purchase and binding of books, purchase of instruments and models for drawing lessons, expenses attending classes - - - -	4,987	25
	<u>11,158</u>	<u>25</u>

The classes were kept on till the early part of July. Experience showed that during the fine summer days the need of walking exercise, which is so conducive to health and to family affection, led to a notable diminution in the number of the pupils. However, the number did not fall below 200. Perhaps this experiment will lead to an earlier closing of the school year.

NOTE VI.

SPECIAL INSTRUCTION IN THE BUILDING ARTS.

GENERAL OBSERVATIONS.

Next to agriculture, the earliest form of human industry, that which for all communities is of the most imperious necessity, is the art of constructing dwellings, private buildings and public edifices of all kinds. Since the origin of society the progress of this art has been from age to age the measure of the degree of civilization to which nations have attained. In our days the development of railroads has been the occasion (and this perhaps is not one of the least services they have rendered) of very notable progress in the building art, and of a general improvement in all the details of public or private constructions. The number of those who have applied themselves to this branch of industry has increased in an enormous proportion, and it is more than ever important to propagate, by means of instruction, the knowledge of the true principles of building, of proportions, and of the best arrangements of details; whereas up to the present time the object proposed in the teaching of architecture seems to have been the forming of clever artists in decoration. For most architects a building—a public or a private edifice, is often merely an object of art. Purpose, fitness, turning space to account, sanitary fitness even, are but secondary matters, often sacrificed to decorative effect. Thus limited in their studies and their views, architects neglect the matters really necessary to the builder, are ignorant of the laws of the resistance of materials, of the stability of walls, of arches, etc.

The reform of the School of Fine Arts will perhaps effect some desirable modifications in this state of things; but it does not seem to be the less advisable that, beyond the pale of that high institution, endeavours should be made by every possible means to generalize, to spread far and wide, the principles which are taught by science and practice in whatever concerns the art of building. Already the private exertions of a professor of the Conservatory have succeeded in bringing together the means for founding at Paris a free school of architecture, in which all branches of that art will be treated, and no doubt architects will be formed,

who, while knowing how to observe the rules of art and of good taste, will be more versed in the principles of construction than most of their predecessors.

In the preceding report, when speaking of superior technical instruction, mention was also made of the position that it would be expedient to assign to the teaching of architecture and the art of building in the central district schools that are to be founded. But, in a lower sphere than that of the Imperial School of Fine Arts and other analogous institutions which have to give instruction of a higher order, it is important that the means of instruction should be multiplied for the class—becoming ever more numerous—of workmen who are engaged in the building trade.

SCHOOLS FOR BUILDERS IN GERMANY.

In most of the German states there exist special classes and schools for the building trade. In the evening and Sunday classes the pupils, whether still young or engaged in some profession, are subdivided into sections, of which one at least is composed of working builders.

But besides this, special schools have been founded, which are open to workmen of that profession during the winter, when, their work being suspended, they can come and complete their technical instruction at small cost.

It is important to describe the organization of such schools, for it might be imitated with success.

*Building School (Ban-Gewerbe-Schule) at Nienburg, Kingdom of Hanover.**

In this school instruction is only given during the winter, from the 21st of October to the end of March. The pupils are divided into three classes, in which are taught, in accordance with a graduated system :

The German language and correspondence.

Arithmetic and elementary algebra with their applications.

Elementary and descriptive geometry with their applications.

Plotting.

Elements of physics and the knowledge of materials.

Elements of mechanics, with their application to building.

The details of the art of building.

Geometrical and ornamental drawing and modelling.

Book-keeping.

More than half the hours of study, which amount to from sixty to seventy-two in the week, are devoted to drawing applied to all the details of building, and to the making of designs.

In 1863-64 this school had 14 professors and 195 pupils belonging to the following trades :—Masons, 89 ; joiners, 87 ; slaters, 2 ; millwrights and mechanics, 9 ; cabinet makers, 7 ; locksmiths, 1. The majority ranged from 17 to 25 years of age ; one only was 37.

* Report on the Organization of Professional Instruction in Germany, p. 48.

*Builders' School (Bau-Gewerbe-Schule) at Holzminden,
Brunswick.**

This school offers a remarkable exception to the system generally followed in Germany. It receives boarders, a fact explained by the character of the students who attend the school. Most of the pupils do not belong to the town, and come to follow the courses in winter only.

No pupils are admitted but those already engaged in one of the trades connected with building. They wear a uniform.

During the whole time of the courses, which is			
20 weeks in winter, the establishment supplies	Fr.	c.	
lodging and board for - - -	101	25	
Teaching, firing, lighting, writing and drawing			
necessaries, uniform, medical attendance, and			
washing - - - - -	168	75	
Total - - - - -	270	00	

Which for 140 days comes to less than 2f. a day.

The discipline is the same as in a college.

The school is divided into three classes of different degrees, and the same branches are taught as in the Nienburg school.

At the conclusion of the studies, and when the pupils have made a tour of instruction, a certificate is delivered to those who deserve it.

The establishment can accommodate as many as 500 pupils, which fact shows the importance rightly attached to the particular branch of industrial art for which it is intended.

Building Schools in Saxony.

In this kingdom there are no less than five schools especially devoted to the same kind of instruction as the preceding, and intended to train master masons and carpenters ; they are situated in small towns on the banks of the Elbe.

The instruction extends over three winter half-years, and the subjects taught are nearly the same as in the schools just described.

The examples and details contained in the report on the organization of professional education in Germany will doubtless suffice to guide those local authorities or private individuals who may wish to found similar institutions.

* Report on the Organization of Professional Instruction in Germany.

NOTE VII.

CENTRAL SCHOOL AT LYONS.

ORGANIZATION.

The central school at Lyons was founded in 1857 by the efforts of 30 citizens of that town, and placed under the direction of M. Girardon, one of their number. Without having the pretension to raise its studies to the level of those in the Central School of Arts and Manufactures at Paris, this establishment had chiefly in view the requirements of the industries in the district of which Lyons is the centre, and those of the youth who were to follow them.

The social capital of the foundation was fixed at 225,000f., and the whole amount was subscribed for ; but as yet the calls form a total of only 150,000f.

It is a joint-stock company, in which every member has a share equal to 7,500f.

The house in which the school is established was taken on lease for 18 years, at the rent of 12,000f. per annum ; and the company have expended 40,000f. to adapt it to their purpose.

The furniture, collection of models, the tools and apparatus of the workshops and laboratories, &c. have cost 18,000f.

The school can receive from 100 to 110 pupils ; it had 86 in 1865.

During the year 1863-64, the number of pupils being 75, the receipts amounted to 55,000f., and the expenses to 47,000f., which makes 626f. for each pupil ; but this expense will diminish proportionally as the number of pupils increases.

The charge to pupils is 700f. a year, including the expenses of the laboratory and workshops.

The pupils are day scholars, and those whose friends do not reside in Lyons find board and lodgings with some of the professors or in boarding schools, at prices varying from 800f. to 1,000f. a year, including firing, washing, and mending, so that not taking into the account clothes and pocket money, the expenses of a young man may be limited to 1,500f. or 1,800f.

In 1863-64, out of the 75 pupils, 52 paid the whole 700 francs, and 23 were aided by grants from the Lyons Chamber of Commerce, by the Council-General, by the Municipal Council, and some few by the school itself.

In 1864-65, there were 49 pupils who paid the whole sum, and 37 who were assisted.

The course of study extends over three years, and all the pupils must follow the same lessons. There are no technical divisions, as in the German institutes.

In the present year, the pupils are sub-divided as follows : first year, 36 ; second year, 28 ; third year, 22.

The school has a director and a sub-director.

The number of professors is 12, one of whom is the sub-director.

The total of the salaries is 30,000f. They are fixed according to the importance of the courses, and to the number of hours each teacher is occupied. The price of a lesson varies from 7f., to 10f., and 15f., for a sitting of two hours.

PROGRAMMES.

The programmes of instruction comprise the following subjects :—

Mathematics.

Higher arithmetic ; algebra ; elementary and applied geometry ; plotting and levelling ; trigonometry ; analytical geometry ; principles of stone cutting, of carpentry, of dialling, of the differential and integral calculus, and of analytical mechanics.

Physics.

General physics ; industrial physics, with its applications to heating steam-boilers and accessories, and to drying and ventilation ; telegraphic apparatus ; electro-plating ; photography ; meteorology ; cosmography.

Mechanics.

General rudiments ; transformation of movements ; simple resistance of materials ; study of prime movers ; hydrostatics ; gauging of water-courses ; hydraulic power ; materials employed in machines ; calculation of the proportions of the parts, and of the construction of a machine ; machine-tools.

Chemistry.

General chemistry, inorganic and organic ; study and industrial manufacture of starch, sugar, gelatine, gums, alcohol, acids, alkaloids, aniline and colouring substances, hydro-carbons, essences, oils, fats, fatty acids, and candles ; qualitative and quantitative analysis ; metallurgy ; industrial treatment of the principal metals ; bleaching ; dyeing of silk, cotton, and wool ; printing and dressing ; alimentary substances, their preservation ; adulteration of trade products, alimentary substances, and textile fabrics, with the means of detecting it ; manures, their manufacture, and analysis ; chemistry applied to agriculture ; geology and mineralogy.

Civil Engineering.

Materials employed in building, their resistance, their use ; masonry, foundations ; plans ; tracing of roads ; carriage roads ; bridges ; railways ; permanent ways ; embankments, works of art ; locomotives and railway carriages ; navigation ; rivers ; canals ; locks ; weirs.

Natural History.

Organization and physiology of man and animals; noxious and useful animals; general hygienics of man; dangerous and unhealthy occupations and factories; contagious diseases; first step to be taken in urgent cases; anatomy and physiology of plants; rural economy, soil, manures; agricultural meteorology; agricultural machines and moving powers; alimentary and industrial plants; gathering and preservation of produce; subsoiling; zootechny; domestic animals, domestication; labour; flesh, milk, and other produce; breeding of fish, bees, and silkworms; acclimatization.

Commercial Law and Accounts.

On different companies, brokers, stock brokers, commission-agents; on loans, sureties; bills of exchange; insurance; bankruptcy; unhealthy establishments; patents; trade marks, &c.

Commercial studies; book-keeping; trading operations.

English Language.

English grammar; translation, composition; commercial correspondence; moneys; weights and measures; lectures.

Drawing.

Sketching of machines; drawing of ornaments; projection; working drawings of machines; tinted drawings; plans of machines.

Manufacture of Textile Fabrics.

Natural history of silk; spinning; throwing, weaving and testing of silks; sorting and cleaning; winding, warping, beaming; putting together the loom; consequence of defects in operation; decomposition of tissues; preparing looms for weaving different fabrics.

Manual Occupations.

Works executed by the pupils in the school workshops, in joinery, turning, tin-working, forging, and fitting.

Visiting Works.

Frequent visits are made by the pupils, under the conduct of professors, to the principal manufactories in Lyons and its environs, in order to initiate the pupils in industrial labours.

At the end of three years' study diplomas are delivered to the pupils who have given proofs of competent knowledge in all the branches of instruction.

The particulars here given show that, without the assistance of the State, the efforts of a few inhabitants of Lyons have succeeded, in a few years, in founding and developing an important establishment of superior technical education for the youth of that district.

Such an example cannot be too much imitated.

NOTE VIII.

COMMERCIAL SCHOOL FOUNDED IN 1864, BY THE
PARIS CHAMBER OF COMMERCE.

GENERAL PROGRAMME.

The general programme of the Commercial School is as follows :—

The studies extend over three years, to which a fourth year is added to secure proficiency.

The curriculum comprises caligraphy, orthography, the French language, commercial geography, commercial history, technology, arithmetic, accounts, foreign exchanges, book-keeping, commercial correspondence ; the English, German, Spanish and Italian languages ; drawing.

A committee, chosen annually from among the members of the Chamber of Commerce, is charged with the general control of the school and the supervision of the studies.

The Chamber of Commerce delivers diplomas to the pupils who in the complementary year, have given proofs of real knowledge and sound instruction.

Certificates of capacity are distributed to those who, at the end of the third year, successfully pass an examination in all parts of the curriculum.

The school is open from eight in the morning till five in the afternoon.

It receives only out-door pupils, of twelve years old at least, and after examinations proving sufficient elementary instruction.

Boys under twelve can only be admitted into a preparatory class.

The payment is fixed at 20 fr. per month, including all school necessities, except books.

This payment is made monthly and in advance.

The duties of the school commence on the 1st of October every year.

APPENDIX A.

SUMMARY OF THE AID GIVEN BY THE GOVERNMENT TO
TECHNICAL EDUCATION IN THE UNITED KINGDOM.

1. The assistance afforded by the State to this special form of secondary education is made through the Science and Art Department of the Committee of Council on Education, and is in two forms, viz., one to instruction in Science, the other to that in Art.

2. The existing action through the Science and Art Department is to aid instruction in *Science* in the following subjects:—1, practical plane and solid geometry; 2, machine construction and drawing; 3, building construction or naval architecture and drawing; 4, elementary mathematics; 5, higher mathematics; 6, theoretical mechanics; 7, applied mechanics; 8, acoustics, light, and heat; 9, magnetism and electricity; 10, inorganic chemistry; 11, organic chemistry; 12, geology; 13, mineralogy; 14, animal physiology; 15, zoology; 16, vegetable physiology and economic botany; 17, systematic botany; 18, mining; 19, metallurgy; 20, navigation; 21, nautical astronomy; 22, steam; 23, physical geography. And in *Art* in drawing, painting, modelling, and designing for manufacture and decoration.

Action of the
Science and
Art Depart-
ment.

3. In order to place a school or class in connexion with the Science and Art Department, it is necessary that a committee, consisting of at least five persons, should be formed, who will undertake certain duties of superintendence in connexion with it.

As respects Science.

4. The aid consists of—(1) payments to the teachers on the results of instruction as tested by examination, (2) medals and prizes to the successful students, (3) grants to the school in aid of the purchase of apparatus, and (4) Royal Exhibitions and free admissions to the Royal School of Mines in London and the Royal College of Science in Dublin.

Aid to In-
struction in
Science.

5. The payments to the teachers vary from 1*l.* to 5*l.*, according to the class in which the student is placed. There are five classes, the fifth being the lowest. The payments are only made for the instruction of students of the artizan or weekly wages class, and those whose incomes are less than 100*l.* per annum. The teacher to be qualified to earn payments on results must have taken a 1st or 2nd class, unless he has obtained some University degree.

Payments to
Teachers.

6. The examinations are held in May. The examination in each subject is held over the whole kingdom on the same night. It is not necessary to enable a class to be examined and obtain prizes, &c. that the teacher should be certificated. If a satisfactory committee be formed, any class or single student can be examined, however taught.

Examinations.

7. Prizes, which, with some few restrictions, are open to all students, are given to those who obtain a 1st, 2nd, or 3rd class. To the best in each subject are given a gold, a silver, and two bronze medals.

8. Six Royal Exhibitions of the value of 50*l.* per annum, tenable for three years, are given in competition at the May examinations. Three of these are to the Royal School of Mines in London, and three to the Royal College of Science in Dublin. Free admissions are given to the courses at these institutions to all who take gold medals.

9. The detailed rules will be found in the Science Directory, published by the Department, which will be furnished on application to the Secretary, Science and Art Department.

As respects Art.

Aid to In-
struction in
Art.

10. *Firstly*.—Towards the teaching of elementary drawing in school for the poor. This aid consists of payments to the managers of 1s., 2s., or 3s. on account of children satisfactorily taught drawing, and who pass a very elementary examination of the first grade. This grade consists of drawing in outline from flat examples, drawing from regular solids or objects of simple form, and of easy problems in practical geometry. Of payments of 5s. or 10s. on children or pupil-teachers who pass the more advanced or second grade examination, and of prizes to successful children and pupil-teachers.

The second grade is an examination of a higher standard than that of the first grade, but in the same subjects, with the addition of perspective and mechanical drawing. Examinations are held in May in any elementary school taught by a master holding a certificate for drawing, or who has passed a second grade examination in any of the three subjects of drawing taught in elementary schools.

Night Classes.

11. *Secondly*.—Towards art instruction in night classes for artizans held in elementary schools, in literary, mechanics', or similar institutions. This aid consists of payments of 10s. or 15s. on account of artizans or their children above 12 years of age satisfactorily taught drawing of the second or third grades; of prizes to successful students; and of payments towards the local expenses of examination.

The third grade is represented by works embracing the whole course of instruction in night classes or schools of art, such as drawing from examples, from casts or models, from nature, the antique, or the life; painting, flowers, landscape, or from life; designing or drawing for decorative purposes.

Schools of Art.

12. *Thirdly*.—To schools of art held in rooms entirely devoted to art instruction. This aid consists of similar payments to those awarded to night classes, and of the following additional payments:—

20s. on account of every artizan satisfactorily instructed in art.

15l. or 20l. on account of art pupil-teachers.

5l. or 10l. on account of students trained for art teachers or National scholars.

3l. on account of free studentships to artizans submitting advanced works.

10l. on account of expenses of annual report and examination.

13. Prizes are given to successful students, and the advanced studies of the schools of Art are brought together in a National competition, when gold, silver, and bronze medals, and other prizes are awarded.

14. Elementary schools, night classes, and schools of art are all aided to the extent of 50 per cent. in the purchase of examples.

National Art
Training
School.

15. *Fourthly*.—By the maintenance of the National Art Training School at South Kensington, in which highly qualified students from local schools of art are admitted and trained as masters for schools of art, or as designers, or art-workmen. Such students receive allowances for their support of from 15s. to 40s. weekly.

Art Museum
and Library.

16. *Fifthly*.—Through the National Museum of Decorative Art and the National Art Library, which are made as far as possible circulating collections for the benefit of local schools of art.

17. The detailed regulations for the administration of Art Instruction are given in the Art Directory.

Instruction in Science in Elementary Schools.

Secondary
Instruction in
Elementary
Schools.

18. By the Minute of the 20th February 1867, additional grants are made by the Educational Establishment at Whitehall to elementary schools under inspection for instruction in subjects of secular instruction.

beyond the reading, writing, and arithmetic as specified in Standard VI. of the Code. The subjects may be those of science as already specified. These grants may amount to 8*l.* when fully earned in a school or school department under its own teacher, and are paid by the Education Department, Whitehall.

19. The managers of such an elementary school under inspection can permit their premises to be used for science teaching provided that there be no interference with the primary purpose of the elementary school or its three attendances. A science class may thus be formed in connexion with and receiving payments from the Science and Art Department as already explained. Science Classes in Elementary Schools.

20. In an elementary school not under inspection of the Education Department, and, therefore, not receiving State aid to elementary instruction, science classes may be formed in connexion with the Science and Art Department without any restriction as to the time or manner in which the instruction in science may be given.

Additional Aid by Scholarships and Exhibitions.

21. The Minute of the 21st December 1867 provides for two forms of Elementary scholarship in connexion with elementary schools whether receiving State aid as such or not. The first of these is the elementary school scholarship. 5*l.* are granted to the managers of any elementary school for the support of a deserving pupil if they undertake to support him for a year and subscribe 5*l.* for that purpose. One such scholarship is allowed per 100 students in the school. The selection of the student for the scholarship is to be by competition; the details of this, however, the managers of the school may arrange as they please, subject to the approval of the Science and Art Department. The payment of 5*l.* by the Science and Art Department is made conditional on the student passing in a branch of science at the May examination. Schools' Scholarships.

22. The second, a more advanced scholarship, is "the Science and Art Scholarship," of which, again, there may be one per 100 students. This is granted without any corresponding contribution on the part of the locality. The Science and Art Department makes a grant of 10*l.* towards the maintenance, for one year, of the most deserving student or students in an elementary school who have taken a first grade in Free-hand Drawing and elementary Geometry, and passed in some branch of science, on condition that, at the end of the year, the student obtains at least a third class in the subject of science in which he originally passed or passes in some other subject. In both these cases the student must be from 12 to 16 years of age. Science and Art Scholarships.

23. Lastly, for advanced scientific instruction, the Minute offers local exhibitions to enable students to complete their education at some college or school where scientific instruction of an advanced character may be obtained. The Science and Art Department will make a grant of 25*l.* per annum, for one, two, or three years for this purpose when the locality raises a like sum by voluntary subscriptions. And if the student attend a State school, such as the Royal School of Mines in London, the Royal College of Chemistry in London, or Royal College of Science in Ireland, the fees are remitted. It is a condition that the exhibition is awarded in competition, the branch or branches of science for which may be fixed by the locality, and that the student pursues his studies satisfactorily. Science College Scholarships.

APPENDIX B.

TABLE showing the NUMBER of STUDENTS receiving Instruction and examined in the various Science Subjects since the Year 1864.

	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.	XI.	XII.	XIII.	XIV.	XV.	XVI.	XVII.	XVIII.	XIX.	XX.	XXI.	XXII.	XXIII.
	Practical Plane Geometry.	Mechanical and Drawing.	Building Construction and Naval Architecture.	Elementary Mathematics.	Higher Mathematics.	Theoretical Mechanics.	Applied Mechanics.	Acoustics, Light and Heat.	Magnetism and Electricity.	Inorganic Chemistry.	Organic Chemistry.	Geology.	Mineralogy.	Animal Physiology.	Zoology.	Vegetable Physiology and Economic Botany.	Systematic Botany.	Mining.	Metallurgy.	Navigation.	Nautical Astronomy.	Steam.	Physical Geography.
Students under instruction - Dec. 1864 - Do. examined	1,285 608	608 293	203 74	330 150	— 32	185 94	131 50	608 244	551 291	2,068 946	451 139	209 170	81 19	1,176 548	1,176 182	492 229	122 33	28 15	145 93	1,448 103	648 82	11 76	165 121
Students under instruction - Dec. 1865 - Do. examined	1,097 517	874 469	406 233	609 280	40 24	303 178	187 86	578 327	598 332	2,129 1,043	289 121	387 194	60 21	961 497	157 79	264 138	174 114	30 22	136 62	849 118	802 77	238 95	671 409
Students under instruction - Dec. 1866 - Do. examined	1,598 783	1,207 764	751 467	1,422 778	13 36	409 228	115 110	972 590	1,145 728	1,967 1,082	319 121	293 207	74 84	916 599	259 127	140 100	68 79	23 38	117 63	1,327 144	1,201 83	145 121	883 931
*Students under instruction - Dec. 1867 -	2,500	2,398	1,975	1,665	35	627	449	1,278	1,649	2,316	218	471	46	1,739	414	326	98	—	84	1,039	884	191	1,834
																							11,385

The progress of the Science Schools since the passing of the general Science Minute, June 1859, is shown in the following table:—

	No. of schools.	No. under instruction.
1860	9	500
1862	—	1,330
1864	70	4,660
1866	153	6,835
1867	212	10,230

The 212 schools had 560 classes in different subjects. Of the 10,230 persons under instruction 4,530 came up for examination, besides 400 persons not taught in classes aided by the Department. 8,437 papers were worked; 6,120 were passed.

* This is only approximately correct, as all the returns have not yet been received.

APPENDIX C.
RETURN OF STUDENTS entered at the ROYAL SCHOOL OF MINES since the commencement of the School in 1851.

Description of Students.	Number entered each Session.														
	1851-2.	1852-3.	1853-4.	1854-5.	1855-6.	1856-7.	1857-8.	1858-9.	1859-60.	1860-1.	1861-2.	1862-3.	1863-4.	1864-5.	1865-6.
Matriculated Students entering for 1, 2, or 3 years' study (including Royal Exhibitions).	15	14	15	13	16	8	8	12	14	6	17	17	20	13	13
Perpetual Students always entitled to attend Lectures.	—	1	3	3	1	1	3	1	2	—	—	—	—	—	—
Occasional Students entering for special Courses, viz:—	49	50	47	48	54	45	68	55	75	187	140	100	115	89	108
All the Lectures—	—	—	—	6	4	3	—	—	—	—	—	—	—	—	—
Lectures on Chemistry—	20	20	28	22	23	18	33	24	33	66	40	28	48	32	24
Natural History—	25	12	8	2	3	3	11	8	9	10	8	4	6	4	11
Physics—	16	15	4	5	5	5	6	7	16	29	19	19	27	30	22
Geology—	14	17	11	11	9	8	18	18	22	26	27	20	17	13	15
Mining—	—	—	—	—	—	—	{	8	5	11	9	7	3	2	6
Mineralogy—	14 {	16	8 }	2	7	7	15	10	13	14	12	6	6	6	5
Metallurgy—	13	11	7	2	3	6	5	5	3	8	8	7	4	1	5
Applied Mechanics—	—	9	7	2	3	—	9	13	6	22	14	6	3	4	6
Mechanical Drawing—	—	—	—	—	—	—	—	—	—	1	3	3	1	1	1
Total—	64	64	65	64	71	54	79	67	89	193	157	117	135	102	121
Lectures to Working Men, viz:—	958	1,770	1,820	1,800	2,280	1,800	2,242	1,800	1,800	2,400	1,800	2,237	1,800	2,274	1,800
1st Course—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2nd Course—	438	570	600	600	600	600	600	600	600	600	600	600	600	600	600
3rd Course—	500	600	600	600	600	600	600	600	600	600	600	437	600	600	600
4th Course—	—	—	—	—	480	—	442	—	—	600	—	600	—	474	—
Evening Lectures, viz:—	—	—	—	317	—	—	—	—	—	932	703	311	247	370	269
Course { Chemistry, by Dr. Hofmann—	—	—	—	253	—	—	—	—	—	243	141	124	104	220	—
{ Nat. History, by Prof. Huxley—	—	—	—	64	—	—	—	—	—	203	138	64	143	—	131
{ Physics, by Dr. Tyndall—	—	—	—	—	—	—	—	—	—	258	283	123	—	150	—
{ Geology, by Prof. W. W. Smyth—	—	—	—	—	—	—	—	—	—	228	141	—	—	—	138

APPENDIX D.

LIST of SCIENCE SCHOOLS and CLASSES throughout the UNITED KINGDOM in connexion with the SCIENCE AND ART DEPARTMENT of the COMMITTEE OF COUNCIL ON EDUCATION, 1867.

Town.	Where held.	No. of Individuals under Instruction at Christmas 1867.
ENGLAND.		
Abingdon - - -	British School - - -	40
Accrington - - -	Mechanics' Institution - - -	29
Alderley Edge - - -	Day School-room - - -	19
Almondbury - - -	King James's Grammar School - - -	24
Alnwick - - -	Scientific and Mechanical Institute - - -	25
Andover - - -	British School - - -	38
Ashby-de-la-Zouch - - -	Mutual Improvement Society - - -	17
Ashton-under-Lyne - - -	Mechanics' Institution - - -	24
" " - - -	Parish Church School - - -	14
Bacup - - -	Mechanics' Institution - - -	42
Banbury - - -	British School - - -	31
Barnsley - - -	St. John's School - - -	12
Bingley - - -	Mechanics' Institution - - -	15
Birmingham - - -	Midland Institute - - -	121
" - - -	St. Barnabas' School - - -	47
" - - -	School of Art - - -	76
" - - -	Bloomsbury Institute - - -	106
" - - -	Clarendon Chambers - - -	11
Birstal - - -	Mechanics' Institution - - -	26
Blackburn - - -	Wesleyan School - - -	8
" - - -	Mechanics' Institution - - -	15
Blandford - - -	Working Men's Club - - -	21
Bodmin - - -	Literary Institution - - -	31
Bolton - - -	Bridge Street Schools - - -	30
" - - -	Science and Art School - - -	193
" - - -	Mechanics' Institution - - -	50
Breage - - -	Literary Institution - - -	24
Brimscombe - - -	Reading Room - - -	15
Bristol - - -	Trade School - - -	143
Bromsgrove - - -	Literary and Mechanics' Institution - - -	23
Burnley - - -	Church of England Literary Institution.	54
" - - -	Carlton Road School - - -	63
" - - -	Westgate School - - -	21
" - - -	Mechanics' Institution - - -	48
" - - -	Grammar School - - -	45
Bury - - -	Athenæum - - -	70
Camborne - - -	British School - - -	22
Canning Town - - -	Holy Trinity Schools - - -	12
Cardiff - - -	Free Library - - -	42
Chatham - - -	St. Mark's School (New Brompton) - - -	30
" - - -	St. Mary's National School - - -	43
Cheltenham - - -	Bedford Buildings - - -	132
Chester - - -	Mechanics' Institution - - -	23

Town.	Where held.	No. of Individuals under Instruction at Christmas 1867.
Chorley (Lanc.)	National School	15
Cold Norton	National School	10
Compstall	Athenæum	27
Congleton	Wesleyan School-room	12
Cradley	School Street	12
Crewe	Mechanics' Institution	43
Croydon	Literary Institution	21
Darlington	Mechanics' Institute	14
Dartford	Working Men's Institution	49
Dartmouth	Mutual Improvement Society	24
Darwen	Mechanics' Institution	15
Denton	Mechanics' Institution	31
Deptford	St. Paul's School	18
"	Christ Church Mission Hall	25
Derby	Grammar School	13
Dewsbury	Mechanics' Institution	17
Droylsden	Educational Institution	54
Eagley	Eagley Institute	24
Earlestown	District School-room	19
Eastington	National School	15
East Retford	National School	29
Eastwood	Mechanics' Institution	11
Elland	Mechanics' Institution	20
Exeter	10, Bedford Circus	30
Failsworth	Mechanics' Institution	8
Falmouth	National School	13
Gateshead	National School-rooms	52
Gloucester	Blue-coat School	44
"	Free Library	34
Greenwich	Literary Institution	41
"	Girls' National School	19
Halifax	Working Men's College	34
Haslingden	The Institute	18
Heywood	Mechanics' Institution	42
Hollinwood	Working Men's Club and Institute	28
Huddersfield	Mechanics' Institution	23
Hull	Nautical Schools	73
Huntingdon	Walden's School	12
Hyde	Mechanics' Institution	34
Kettering	National School	50
Kingsbridge	Town Hall	17
Kinver	National School	27
Lancaster	Mechanics' Institution	44
Leeds	Mechanics' Institution	45
Lees	Parish Church Schools	36
Leicester	St. Martin's School	39
"	Portland Street	5
Lincoln	Mechanics' Institution	13
Liverpool	Free Library	56

Town.	Where held.	No. of Individuals under Instruction at Christmas 1867.
Liverpool	Liverpool Institute	107
Llanelly	Copper Works School	43
London :—		
Bath Street	City Middle Class School	34
Battersea	Sir Walter St. John's School	49
"	Training College	80
Bermondsey	Christ Church Schools	15
Bethnal Green	Birkbeck School	88
"	National School	107
Chelsea	St. Mark's Training College	88
"	Literary and Scientific Institution	11
"	St. Luke's Parochial School	52
Dock Street	Sailors' Home	296
Great Ormond Street	Working Men's College	12
Hackney	St. Thomas' Square School	44
Islington	Lower Islington Public School	126
Knightsbridge	Albert Working Men's Club	57
Lambeth	Boys' School-room, Lambeth Green	155
Leadenhall Street	City of London College	19
Limehouse	St. Anne's National School	20
Regent Street	Royal Polytechnic Institution	42
Waterloo Road	St. John's Schools	33
West Brompton	Edith Grove School-room	20
Whitechapel	Society's School, St. Mary's Street	16
Macclesfield	Modern Free School	41
Maldon	Mechanics' Institution	11
Manchester	Mechanics' Institution	200
"	Roby Educational Society	20
"	Corporation Street	38
"	Ardwick Wesleyan School	26
"	Hulme Working Men's Institution	28
"	St. George's National School	16
Melton Mowbray	Church School-room	3
Middlesborough	Church of England Institute	10
Middleton	National School	30
Modbury	Mechanics' Institution	9
Mossley	Mechanics' Institution	25
Nelson-in-Marsden	Lomeshaye Mills	36
New Mills	Mechanics' Institution	34
Newton Heath	All Saints	16
Northampton	Guildhall and Working Men's Club	166
North Ormesby	Church Institution	7
Nottingham	Trinity School	54
Oldbury	National School	52
"	Messrs. Chance's School	14
Oldham	Glodwick Mutual Improvement Society.	30
"	Science and Art Schools	68
"	Parish Church School	25
"	Analytical Society	42
"	Temperance Seminary	12
Padiham	National School	10
Patricroft	Mechanics' Institution	27

Town.	Where held.	No. of Individuals under Instruction at Christmas 1867.
Pendleton	Mechanics' Institution	11
Penzance	School of Art	20
Plumstead	Burrage Road School	54
Plymouth	Buckwell Street	12
"	Courtenay Street	162
"	Navigation School	3
Pontypridd	Morgan Street	24
Portland	The Grove School	29
Preston	Institution, Avenham	59
Purleigh	National School	21
Ramsbottom	Public Institution	20
Rawtenstall	Mechanics' Institution	55
Redruth	Literary Institute	10
Rochdale	Lyceum	48
Royton	St. Paul's National School	55
St. Helen's	St. Thomas' School	22
Salford	Working Men's College	31
"	St. John's Hall	24
Slough	Mechanics' Institution	21
Southminster	National School House	15
Southport	The Church Institute	22
Stockport	Mechanics' Institution	43
"	Sunday School, Duke Street	18
Stratford	Working Men's Hall and Club	56
Stroud	Stroud Institute	27
Swansea	Royal Institution	38
Tavistock	British School	41
"	Gulworthy School	34
Tebworth	Wesleyan Day School	12
Thorne	Brooke's Grammar School	12
Torquay	School of Science and Art	33
Ulverstone	Temperance Hall	19
Walsall	Grammar School	21
Warrington	Museum and Library	100
Wellingborough	Lower Grammar School	29
Werneth	Mechanics' Institution	17
Whaleybridge	Mechanics' Institution	17
Wigan	Mining and Mechanical School	60
Wisbech	St. Peter's School	20
Wolverhampton	Athenæum	10
"	St. John's School	4
"	St. Luke's	8
"	St. Peter's	30
Wolverton	Science and Art School	44
Woolwich	Royal Arsenal Science Classes	147
"	National School, King Street	37
"	St. Thomas' School	97
"	Western District National School	20
"	Presbyterian Schools	95
Worcester	Guildhall	34

Town.	Where held.	No. of Individuals under Instruction at Christmas 1867.
Yarmouth, Great	Navigation School - - -	110
York - - -	Popular Institution - - -	30
SCOTLAND.		
Aberdeen - - -	Mechanics' Institution - - -	51
" - - -	Navigation School - - -	317
Banchory - - -	Lady Burnett's School - - -	8
Corsock - - -	Girls' School - - -	8
Dumbarton - - -	Burgh Academy - - -	220
Dundee - - -	High School - - -	62
Glasgow - - -	Secular School - - -	76
" - - -	Andersonian University - - -	730
Inverness - - -	School of Science and Art - - -	20
Kilmarnock - - -	New Public School - - -	48
Leith - - -	Navigation School - - -	178
Newhills, Aberdeenshire	Free Church School-room - - -	17
IRELAND.		
Antrim - - -	Main Street National School - - -	56
Armagh - - -	Natural History Society's House - - -	16
Athlone - - -	St. Mary's School - - -	31
" - - -	Ranelagh School - - -	30
Bagenalstown - - -	National School - - -	34
Bailieboro' - - -	Model National School - - -	60
Ballyboley - - -	School-room - - -	34
Ballycarry - - -	Model School - - -	21
Ballymena - - -	Model School - - -	16
Ballywilly - - -	National School - - -	14
Banbridge - - -	Scarva Street National School - - -	49
Bangor, Co. Down	National School - - -	25
Belfast - - -	Model National School - - -	28
" - - -	Fisherwick Place - - -	78
" - - -	Academy Street - - -	12
" - - -	Crumlin Road - - -	28
" - - -	Maritime Model School - - -	85
" - - -	National Model School - - -	93
" - - -	Hamilton Street - - -	32
" - - -	May Street - - -	14
" - - -	Union Place - - -	10
" - - -	Milford Street - - -	20
" - - -	Seamen's Friend Society's School-room.	20
" - - -	St. George's School - - -	25

Town.	Where held.	No. of Individuals under Instruction at Christmas 1867.
Belfast - - -	Brown's Square National School -	17
" - - -	Wolfhill Mill - - -	19
Bessbrook - - -	The School-house - - -	22
Braidwater - - -	National School - - -	22
Carlow - - -	Christian Brothers' School - - -	19
Carrickfergus - - -	Model School - - -	34
Castleshane - - -	School-house - - -	15
Coleraine - - -	Model National School - - -	57
Comber - - -	No. 1. National School - - -	90
" - - -	Smyth's National School - - -	
Cooraclare - - -	National School - - -	33
Cork - - -	District Model School - - -	65
Crossgar - - -	National School - - -	13
Downpatrick - - -	Young Men's Christian Association -	23
Drogheda - - -	St. Mary's National School - - -	35
Dublin - - -	Central Model School - - -	107
" - - -	King's Hospital School - - -	45
" - - -	55, Aungier Street - - -	12
Dundalk - - -	Free Library - - -	60
Eglisli - - -	National School - - -	50
Enniscorthy - - -	Model School - - -	33
Enniskillen - - -	Town Hall - - -	15
Fintona - - -	National School - - -	8
Galgorm - - -	National School - - -	30
Galway - - -	Model School - - -	42
Garrison, Co. Fermanagh -	National School - - -	12
Gilford - - -	National School - - -	28
Holywood - - -	Sullivan Schools - - -	76
Kilkenny - - -	District National Model School -	52
Larne - - -	North End National School - - -	39
" - - -	Model Agricultural School - - -	49
Loughinisland - - -	National School - - -	20
Lurgan - - -	National School - - -	11
Market-hill - - -	Coolmalish National School - - -	20
Monaghan - - -	Church Education School - - -	23
Newport Pratt - - -	Parochial School-house - - -	7
Newry - - -	Model School - - -	38
Newtonbreda, near Belfast.	National School - - -	25
Newtownards - - -	Model School - - -	98
" - - -	101, Church Street - - -	9
Oldcastle - - -	Endowed School - - -	165
Portadown - - -	National School - - -	30
Raphoe - - -	National School - - -	9

Town.	Where held.				No. of Individuals under Instruction at Christmas 1867.
Santry - - -	Incorporated	Society's	Training		64
	College.				
Strabane, Co. Tyrone -	National School	-	-	-	21
Tandragee - - -	Male National School	-	-	-	35
Trim - - -	District Model School	-	-	-	30
Waterford - - -	Model School	-	-	-	50
Whitehouse - - -	National School-room	-	-	-	15
	Total	-	-	-	12,139

APPENDIX E.

I. LIST of SCHOOLS OF ART throughout the United Kingdom in connexion with the SCIENCE AND ART DEPARTMENT of the COMMITTEE OF COUNCIL ON EDUCATION, December 1867.

Name of Place.	Estab-lished.	Population in 1861.	No. of Individuals under Instruction at Christmas 1867.
Aberdeen - - -	1853	73,794	213
Andover - - -	1854	5,221	65
Bath - - -	1854	52,528	235
Birkenhead - - -	1861	52,587	136
Birmingham - - -	1842	295,955	1,010
Boston - - -	1860	15,038	86
Bridport - - -	1865	7,672	92
Brighton - - -	1859	77,693	99
Bristol - - -	1853	154,093	273
Bromsgrove - - -	1860	10,822	78
Cambridge, with branch at Huntingdon	1858	26,361	225
Carlisle - - -	1854	29,436	109
Carmarthen and Swansea - - -	1854	52,573	45
Carnarvon - - -	1853	8,530	71
Cheltenham - - -	1853	39,590	120
Chester, with branch at Crewe - - -	1853	31,101	107
Chippenham - - -	1865	1,603	45
Cirencester - - -	1860	6,334	115
Coalbrookdale and Wenlock - - -	1856	15,662	42
Cork - - -	1850	101,434	182
Coventry - - -	1844	41,647	174
Darlington - - -	1857	26,109	161

Name of Place.					Estab- lished.	Population in 1861.	No. of Indi- viduals under Instruction at Christmas 1867.
Devizes	-	-	-	-	1864	6,638	58
Devonport	-	-	-	-	1859	50,504	105
Dorchester	-	-	-	-	1867	—	66
Dublin	-	-	-	-	1849	254,808	432
Dudley	-	-	-	-	1853	44,975	116
Dundee	-	-	-	-	1856	90,425	493
Durham	-	-	-	-	1853	13,743	106
Edinburgh (Male)	-	-	-	-	1858	170,444	404
„ (Female)	-	-	-	-	1858	170,444	215
Exeter	-	-	-	-	1853	40,000	246
Glasgow	-	-	-	-	1845	395,563	1,020
Gloucester	-	-	-	-	1859	14,320	142
Halifax	-	-	-	-	1859	37,015	115
Hanley	-	-	-	-	1847	25,369	178
Henley-on-Thames	-	-	-	-	1864	5,437	26
Hull	-	-	-	-	1861	98,994	193
Inverness	-	-	-	-	1865	12,499	91
Ipswich	-	-	-	-	1858	37,949	179
Kidderminster	-	-	-	-	1862	15,398	68
Kilmarnock	-	-	-	-	1867	20,698	158
Lancaster	-	-	-	-	1856	14,478	156
Leeds	-	-	-	-	1847	207,153	409
Limerick	-	-	-	-	1852	46,320	83
Lincoln	-	-	-	-	1863	20,995	156
Liverpool, North District	-	-	-	-	1855	} 443,874 {	574
Liverpool, South District	-	-	-	-	1855		545
Llanelly	-	-	-	-	1854		50
Macclesfield	-	-	-	-	1851	36,095	101
Manchester	-	-	-	-	1842	338,346	366
Metropolitan Schools :—							
Female School of Art, Bloomsbury	-	-	-	-	1842	} 2,803,034 {	138
Lambeth	-	-	-	-	1854		402
St. Martin's	-	-	-	-	1854		183
St. Thomas', Charterhouse	-	-	-	-	1853		194
Spitalfields	-	-	-	-	1842		181
West London	-	-	-	-	1862		455
Westminster	-	-	-	-	1861		99
* { Rotherhithe	-	-	-	-	1854		34
{ St. George's-in-the-East	-	-	-	-	1858		24
{ South Kensington	-	-	-	-	1854		992
Newcastle-under-Lyme	-	-	-	-	1853	12,938	54
Newcastle-upon-Tyne	-	-	-	-	1844	109,291	412
Norwich	-	-	-	-	1846	75,000	176
Nottingham	-	-	-	-	1843	74,531	389
Oxford	-	-	-	-	1865	27,561	218

* In connexion with the Training School at South Kensington.

II.—LIST of NIGHT CLASSES for INSTRUCTION IN DRAWING aided by the SCIENCE AND ART DEPARTMENT.

Name of Place.	Where held.	No. of Individual Students receiving Instruction in Drawing in 1867.
Accrington - -	Mechanics' Institution - -	22
Banbury - -	British School - - -	48
Bangor - -	Elementary School - - -	35
Belfast - -	Model National School - -	72
Birmingham - -	Cambridge Street Works Night School.	30
" - -	St. Barnabas' National School -	53
" - -	St. John's School, Ladywood -	37
" - -	St. Mark's Boys' Night School -	50
Brimscombe - -	Reading Room - - -	16
Bristol - -	Trade School - - -	50
" - -	British School, Redcross Street -	37
" - -	Wesleyan Day School, North Street	32
Burslem - -	St. Paul's School, Dalehall - -	20
Cardiff - -	Free Library and Museum - -	32
Cheltenham - -	Parish Church Boys' National School.	35
" - -	St. John's Night School - - -	20
" - -	The Working Man's Club - - -	20
Crewe - -	Mechanics' Institution - - -	44
Dublin - -	Central Model National School -	91
Dudley - -	Mechanics' Institution - - -	33
Falkirk - -	The Grammar School - - -	23
Falmouth - -	Royal Polytechnic Society's Institution.	28
Farnworth - -	Wesleyan School - - -	33
Faversham - -	The Institute - - -	50
Gold's Hill, near West Bromwich.	Messrs. Bagnall's School - - -	71
Greenock - -	School of Art - - -	108
Haslingden - -	The Institute - - -	17
Holbeck - -	Mechanics' Institute - - -	29
Hunslet, Leeds - -	Mechanics' Institution - - -	11
Hoddesdon - -	Mutual Improvement Society's Institution.	12
Keighley - -	Mechanics' Institution - - -	43
Kirkstall - -	Educational Institution - - -	32
Lakenham, Norwich - -	St. Mark's Boys' School - - -	75
Leamington - -	The Museum, &c., 31, Upper Parade	30
Leeds - -	St. George's School - - -	45
Louth, Lincolnshire - -	Working Men's Institute - - -	32

Name of Place.	Where held.	No. of Individual Students receiving Instruction in Drawing in 1867.
Macclesfield - -	National School, Crompton Road -	23
Maidstone - -	Charles Museum, St. Faith Street -	26
Marlborough - -	St. Peter's Evening Class -	23
Metropolitan :—		
Battersea - -	Christ Church National School -	60
" - -	Sherwood Mutual Improvement Society.	24
Bethnal Green - -	National School - - -	75
Middleton - -	National School - - -	29
" - -	Holy Trinity, Parkfield School -	15
Newport, Monmouthshire	National School - - -	33
" - -	Athenæum and Mechanics' Institute	13
Norwich - -	Presbyterian Charity School -	60
Nottingham - -	Mechanics' Institution - -	40
" - -	The Park School - - -	43
Oldbury, near Birmingham	Wesleyan Day School - - -	25
" - -	Messrs. Chance's Evening School, Alkali Works.	60
" - -	National School - - -	79
Otley, Yorkshire -	Mechanics' Institution - - -	14
Padiham, near Burnley -	Church National School - -	26
Plymouth, Devon -	Public Free School, Coburg Street -	45
Raglan, near Newport, Monmouthshire.	National School - - -	15
Retland, Bristol -	St. John's Parochial School, Durdham Down.	30
Redruth, Cornwall -	Literary Institution - -	11
St. Helen's, Lancashire -	St. Thomas' Church Institution -	27
St. Just, near Penzance	The Institution, St. Just - -	26
Smethwick, near Birmingham.	Messrs. Chance's School, Glass Works.	67
Stonehouse, Gloucestershire.	The Institute - - -	19
Thorne, Yorkshire -	Brooks' Grammar School - -	16
Tipton, Staffordshire -	St. Martin's National School -	30
Willenhall, Staffordshire	The Literary Institute - - -	25
Wilton - - -	- - -	27
Wisbech, Cambridge-shire.	Working Club and Institute -	25
Witney, Oxfordshire -	The Wesleyan Mental Improvement Society.	18
Wolverhampton -	St. Peter's National School - -	30
York - - -	St. Saviour's Gate Institute -	52

APPENDIX F.

BRITISH DIOCESAN TRADE SCHOOL.

The history of this school cannot be better given than in the words of the committee of management, extracted from their report read at the annual distribution of prizes on the 8th January 1867 :—

“Ten years have now passed since the old Bristol Diocesan School received the name of the Bristol Diocesan Trade School. The changed name was intended to express the changed character of the school. A very brief recapitulation of the circumstances of the change may here be desirable. The original institution was founded in one of the early years of the present century. It flourished for 40 years as a national school to the whole of Bristol. At the end of that time schools of this nature began to arise in the several parishes, and the old Diocesan School, having fulfilled its office, came to a natural dissolution. But the question then arose as to the use and disposal of the school building, together with other property and resources.

“The committee of that day sought and obtained the effective counsel of the Rev. Canon Moseley. A plan of school work was drawn up by him, the purport of which was to give instruction in those principles of science upon which the various trades are founded. This plan was, after a long and anxious discussion, approved by the committee. The building was prepared for its new work by extensive alterations, and (through the help of the Government) by costly fittings and apparatus; and the transformed school commenced its career 10 years ago. Let the limits of the actual transformation be, however, here defined. The school, as it existed of old, was strictly a Church of England school. The bishop for the time being was its president; its religious teaching was guided and governed by the catechism of the church. These conditions the committee were neither able nor inclined to disturb. It was, however, felt and resolved that, in case of objection by the parents, the children of Dissenters might be excepted from the special Church teaching of the school. Reserving, then, these essential principles of the original institution, the re-modelled school sprang up, and in the place of, or rather in addition to, reading, writing, and the first four rules in arithmetic, it offered to its pupils a thorough course of elementary instruction in theoretical and practical science. The inauguration of the school took place under the auspices of the then Lord President of the Council (Earl Granville), who kindly came to Bristol for that object.

“The committee have now the honour to welcome the present Lord President, his Grace the Duke of Buckingham and Chandos, who visits Bristol for the purpose of distributing the Government prizes gained by the school, as the result of the last examination, after the expiration of 10 years. This act of his Grace will, therefore, it may be considered, sufficiently exhibit the progress of the school without further detail in this report. But one or two explanatory points may be mentioned. The examination referred to is conducted by the Department of Science and Art, and is a very formidable business. It extends over 10 nights, lasting for three hours each night. Sealed papers are received from the department each day, and are opened in the examination room when the hour of examination commences, and the answers are sealed up in the same room and returned to the department each night. One extract from the last year's report of this department may now be given :—

‘That the Trade School at Bristol should, with its 120 pupils, carry off

History of the school.

'four out of the eight gold medals awarded, besides two silver and four bronze medals, and 97 prizes, redounds greatly to its credit, and places it decidedly at the head of the list of Science Schools.' To this let it be added that, after the examinations of that year in all the principal towns of the kingdom, Bristol stood at the head of all the Science Schools in the following subjects:—Inorganic chemistry, organic chemistry, mechanical physics, machine drawing. And in the present year, although the number of medals gained has not been so great, Bristol remains first, and pre-eminently first, in those subjects, and in descriptive geometry and architectural drawing besides.

"The school is, perhaps, yet too young to show practical results of its efficiency beyond these examination successes; but it should be mentioned that one of its pupils and one of its junior masters, who had previously studied in the school, have obtained exhibitions of 50*l.* per annum, tenable for three years, from the Metropolitan School of Mines, and it should also be mentioned that the principal engineering and chemical establishments of the city accept for their vacant apprenticeships, with marked preference and partiality, the pupils of the Trade School.

"Ten years ago the Bristol Trade School presented itself before the city, not, indeed, begging for support, but with the deference, and perhaps the doubtfulness, and, it must be said, with the not unusual adjunct of the debt, of an organized but untried institution. The school presents itself before the city to-day, not boastfully, but with thankfulness, announcing its success. It has paid its debt, and it asks for nothing. It modestly asserts itself to have done what it promised. That the artizans and tradesmen of Bristol recognize the school's worth is evident from this fact, the fees for pupils were quickly raised from 3*s.* 6*d.* to 5*s.* a quarter; and now, at 15*s.* the quarter, the number of pupils is only limited by the accommodation of the building, and does almost exceed the teaching power of the school."

Success of the school.

That the school has not fallen off in efficiency since the date referred to in this report is proved by the fact that at the late examination in science, held last May by the Science and Art Department, the Bristol Trade School, with 118 pupils, carried off between 70 and 80 prizes, and two gold, one silver, and one bronze medal.

The success of the school and the influence it has acquired is also testified to by the head master. He says:—"The result of raising the scale of fees has been that the school has ever since grown in numbers and popularity. Starting with two masters, the school now employs four, and I am of opinion that the limit of our success is by no means reached. Public attention has also been directed by our work to the value of the special teaching we are engaged in. The council of the Clifton Proprietary College has introduced the teaching of applied science on a very efficient scale, and have secured the services of a gentleman formerly engaged as a master of the Trade School, as well as the part services of one of our present staff. The Bristol Grammar School has also arranged to give similar instruction. The Bristol College for Baptist Ministers sends its students to our night classes to study science, and several other less important educational institutions do the same. Moreover, there is hardly a boarding-school in the neighbourhood which is not now making some attempt at technical teaching. The school started in debt. It now not only pays its way, but it has cleared off the debt."

The whole work of instruction carried on at this institution may be classified under the heads of the Trade School, the Mining School, and the Evening Classes.

The Trade School.

The object of the school will be readily understood from the following extract from the prospectus:—"The design of this school is to prepare boys for apprenticeship to the engineering, building, and manufacturing trades, by supplementing the work of the elementary school with instruction in practical mathematics, and physical science in its applications to trade. But while these higher subjects are taught, those which are more elementary receive a careful attention. The studies which form the school routine are:—Writing and book-keeping, the English language, arithmetic and algebra, geometry and mensuration, freehand, mechanical and architectural drawing, and the application of mechanics, physical science, and chemistry. The religious instruction is superintended by a clergyman of the Church of England, but the distinctive formularies of the Church are not taught to those children whose parents have a conscientious objection to them."

There are now (January 1868) 132 boys in the school, divided into two divisions: the second or elementary division, in which nothing but reading, writing, and arithmetic are taught, contains 82 boys; the first, or science division, contains 50 boys. No boy is admitted to the first division without giving proof that he has a satisfactory acquaintance with the elementary subjects. The following table will give an idea of the teaching in the upper division:—

—		10 to 10½.	10½ to 11½.	11½ to 12.	12 to 1.	1½ to 2½.	2½ to 3½.	Time table.
Monday	-	Scripture	English	Euclid	Inorganic Chemistry.	Descriptive Geometry.	Theoretical Mechanics.	
Tuesday	-	Ditto	Ditto	Algebra	Organic Chemistry.	Machine Drawing.	Applied Mechanics.	
Wednesday	-	Ditto	Ditto	Mensuration	Inorganic Chemistry.	Architectural Drawing.	Experimental Physics.	
Thursday	-	Ditto	Ditto	Euclid	Organic Chemistry.	Descriptive Geometry.	Applied Mechanics.	
Friday	-	Ditto	Ditto	Algebra	Inorganic Chemistry.	Machine Drawing.]	Theoretical Mechanics.	

Note.—There is no school on Saturday.

The Trade School opened on the 4th February 1856 with five pupils, and how quickly the special instruction was appreciated may be seen from the following table, showing the number of pupils receiving instruction in science during any time in each year since the foundation of the school:—

1856	-	-	22 pupils.	1863	-	-	48 pupils.
1857	-	-	39 "	1864	-	-	53 "
1858	-	-	39 "	1865	-	-	42 "
1859	-	-	48 "	1866	-	-	36 "
1860	-	-	48 "	1867	-	-	53 "
1861	-	-	48 "	1868	-	-	51 "
1862	-	-	46 "				

Occupations
of the parents.

The class of boys who attend the school may be gathered from the following list of the parents :—

Calling of Boys' Parents.	No.	Calling of Boys' Parents.	No.
Bakers - - - -	2	Grocer - - - -	1
Blacksmiths - - -	4	Hairdressers - - -	2
Brewer - - - -	1	Harness maker - - -	1
Brushmaker - - -	1	Iron mine proprietor - - -	1
Butcher - - - -	1	Mariners - - - -	5
Butlers - - - -	4	Millers - - - -	2
Cabinet maker - - -	1	Milkman - - - -	1
Carpenters - - - -	15	Miners - - - -	2
Carrier - - - -	1	Newspaper reporter - - -	1
Carver and gilder - - -	1	Optician - - - -	1
Clerks - - - -	12	Painters - - - -	5
Coachman - - - -	1	Pawnbrokers - - - -	5
Coal-owner - - - -	1	Printer - - - -	1
Corn dealer - - - -	1	Publicans - - - -	14
Draper and grocer - - -	1	Schoolmaster - - - -	1
Draughtsman - - - -	1	Ship carpenters - - -	2
Engraver - - - -	1	Shoemaker - - - -	1
Engine fitters - - - -	3	Soapmakers - - - -	2
Engineer - - - -	1	Steward - - - -	1
Farmer - - - -	2	Tallow chandler - - -	1
Foremen of shipping yards - - -	2	Toll collector - - - -	1
Fruiters - - - -	2	Traveller - - - -	1
Fly proprietors - - - -	3	Veterinary surgeon - - -	1
Gardeners - - - -	5	Wheelwright - - - -	1
Gentlemen - - - -	2		

The Mining School.

Failure and
re-establish-
ment of the
Mining School.

As might be expected in a town like Bristol, the centre of a large coal, iron, and metal mining district, a Mining School for instruction in science applied to the working of mines is much wanted. Hitherto, however, attempts in this direction have proved failures, and the present class for mining attached to the Bristol Trade School is still too young to enable an opinion to be formed of its probability of success. On this branch of the institution the head master reports :—

“A Mining School was started in connexion with the Trade School. This was supported by voluntary contributions. But this source of income, as might have been expected, at last failed, and the school was temporarily closed. Applications for this special instruction, however, continued to be made, and a class on a self-supporting basis was opened in the school for the study of mining at the close of the last Christmas vacation (January 1868). The teacher is an educated and experienced mining engineer, who receives from each of his pupils a fee of 7*l.* A daily lesson of one hour's duration and occasional visits to the mine and field are made for surveying and levelling. In addition to this these young men pay 3*l.* per annum to the Trade School for the instruction they receive in the sciences. Already we have six students, the eldest 20, the youngest 15.”

The Evening Classes.

Statistics of
the evening
classes.

In order to extend still further the benefits of instruction in science, and to give the old pupils an opportunity of keeping up their knowledge

after they have left school, the masters have established evening classes, of which the following is the programme :—

Chemistry	-	-	Tuesdays and Thursdays	8 till 9
Physical science	-	-	Tuesdays and Thursdays	7 „ 8
Geometrical drawing	-	-	Tuesdays	7 „ 8
Machine drawing	-	-	Tuesdays	8 „ 9
Architectural drawing	-	-	Fridays	8 „ 9
Freehand drawing	-	-	Thursdays	7 „ 8
Model drawing	-	-	Thursdays	8 „ 9
Mathematics	-	-	Mondays and Fridays	7 „ 9
French, elementary	-	-	Mondays and Thursdays	7 „ 8
French, advanced	-	-	Mondays and Thursdays	8 „ 9
French, middle class	-	-	Tuesdays and Fridays	7 „ 8

The fee for either of the French classes is 5s. per quarter; drawing, 3s. the course for each subject; mathematics, 5s. the course; for either of the other subjects, 7s. 6d. the course.

The following statement will show that for the last three years the evening classes have been fairly attended :—

—	1864-65.	1866-67.	1867-68.
Mathematics - - -	16	12	19
Descriptive geometry - - -	41	27	19
Machine drawing - - -	21	—	30
Building construction - - -	12	8	13
Theoretical mechanics - - -	—	11	12
Experimental physics - - -	—	—	15
Chemistry - - -	28	44	35

The eldest student is in the chemistry classes, and is 43; the youngest is a student in the architectural drawing class, and is 13.

The following is the average ages and attendance in each class :—

		Average Age.	Average Attendance.
I. Descriptive geometry	/- -	18	14
II. Machine drawing	- - -	17	21
III. Building construction	- - -	18	8
IV. Elementary mathematics	- - -	21	15
VI. Theoretical mechanics	- - -	21	10
IX. Electricity and magnetism	- - -	21	14
X. Inorganic chemistry	- - -	21	25
XI. Organic chemistry	- - -	21	20

In connexion with these evening classes a Laboratory Class for instruction in Practical Chemistry, including Analysis and Assaying, has been formed under the tuition of the head master. This class meets three times a week in the laboratory of the Trade School from six to nine o'clock, and numbers now 13 students, of whom the eldest is 40, the youngest 15 years old.

APPENDIX G.

RETURN OF THE NUMBER OF ENGINEERING STUDENTS AND
APPRENTICES IN H. M. DOCKYARDS, AND DETAILS OF
THE REGULATIONS UNDER WHICH THEY ARE ADMITTED,
AND OF THE WAGES WHICH THEY RECEIVE.

There are 37 apprentices in Deptford dockyard; 58 apprentices and 42 engineer students in Woolwich dockyard and factory; 69 apprentices in Chatham dockyard; 18 apprentices and 45 engineer students in Sheerness dockyard and factory; 142 apprentices and 62 engineer students in Portsmouth dockyard and factory; 88 apprentices and 70 engineer students in Devonport dockyard and factory; and 45 apprentices in Pembroke dockyard.

The wages of the dockyard apprentices vary from 6*d.* a day in the first year of apprenticeship, increasing by 3*d.* a day for each year's service, to 2*s.* a day in the last year for the ordinary working hours, and from 7*d.* to 2*s.* 4*d.* a day of 10 hours. The pay of engineer students is shown in the regulations at the foot.

Certain of the most intelligent of the dockyard apprentices are selected, after examination, to undergo a superior course of instruction in the dockyard schools, &c. During the fifth and sixth years of apprenticeship are granted scholarships of the value of 10*l.* a year, and the number now undergoing the superior course of instruction is 17. There are also evening drawing classes which *shipwright* apprentices in their fifth year, who have made satisfactory progress in the knowledge of their trade and at the dockyard schools, are allowed to attend two evenings in each week for the purpose of being taught ship drawing by the head draughtsman in the dockyard. Shipwright apprentices and engineer students are also eligible as candidates for entry as students in the Royal School of Naval Architecture at South Kensington, and there are at present 24 Admiralty students at the school.

*Copy of the Regulations relating to Dockyard and Victualling Yard
Apprentices.*

1. The vacancies for these appointments are open to public competition.

2. The list of candidates for dockyard apprenticeship is kept by the superintendents of the dockyards, and for victualling yard apprenticeships by the superintendents of the victualling yards. All applications must be sent in before 1st of May or 1st of November.

3. The candidates must not be under the age of 13 years and 9 months or above the age of 15 years on the first day of the examination. Proof of age will be required by certificate of birth, extract from baptismal register, or declaration before a magistrate. Evidence of respectability and good character must also be produced on a form which will be furnished by the superintendents. They will not be admitted for examination until they have been pronounced fit for Her Majesty's service by the medical officers in the yard, and they should possess the following physical qualifications at the minimum age:—

Height -	-	-	-	4 ft. 8 in.
Weight -	-	-	-	90 lbs.
Girth of chest -	-	-	-	26 ins.

but a deficiency in these requisites will not exclude candidates who may be pronounced by the medical officers to be generally calculated to make efficient workmen.

4. The examinations will commence on the first Tuesdays in June and December.

5. The following will be the subjects of examination, and the maximum number of marks for each subject :—

Arithmetic	-	-	-	-	350
Spelling	-	-	-	-	100
Handwriting	-	-	-	-	100
Reading	-	-	-	-	100
Grammar	-	-	-	-	100
English composition	-	-	-	-	100
Geography	-	-	-	-	100
Euclid, first three books	-	-	-	-	150
Algebra, up to and including quadratic equations, arithmetical and geometrical progression	-	-	-	-	150
Physical qualifications :—Height, weight, girth of chest, and strength	-	-	-	-	200
Total	-	-	-	-	1,450

6. Candidates will be subjected to a preliminary examination in the first four subjects, and should they fail in any of the four they will be at once rejected.

7. Candidates who pass the preliminary examination will be appointed to existing vacancies in the various trades, according to the number of marks gained in the competitive examination; and those who do not obtain appointments will be allowed a second trial at the next examination if not over age, but they must apply to the superintendents for a second nomination.

8. Apprentices who desire it will, in general, be allowed to serve the last two years of their time at sea, provided their parents or guardians approve, and that they are favourably reported on by their officers. They will in such cases receive their day pay and an additional day's pay per week for Sundays, and will be victualled on board and receive tool money. No boy will be sent to sea against his own wish or that of his parents or guardians.

9. Apprentices receiving a superior course of instruction, if sent to sea, will be allowed to continue their studies under the naval instructor.

10. On the expiration of their period of service they will receive a certificate of their character and conduct, the progress they have made in their trades and in the knowledge of the subjects prescribed for dockyard or victualling yard apprentices.

11. The most intelligent of the shipwright apprentices will be eligible for a more advanced education at the School of Naval Architecture, in accordance with the regulations contained in the Admiralty circular of 17th June 1864.

Admiralty, 1st August 1867.

Copy of the Regulations relating to Engineer Students.

1. Vacancies for appointments as engineer students in the factories at Woolwich, Sheerness, Portsmouth, and Devonport will be open to public competition.

2. The lists of candidates will be kept by the superintendents of those dockyards, to whom all applications must be addressed before the 1st of May or 1st of November in each year.

3. Candidates must not be less than 15 or more than 16 years of age on the first day of the examination. Proof of age will be required by certificate

of birth, extract from baptismal register, or declaration before a magistrate. Evidence of respectability and good character must also be produced on a form which will be furnished by the superintendents of the dockyards. They will not be admitted for examination until they have been pronounced fit for H.M. service by the medical officers in the yards.

4. The examinations will commence on the first Tuesdays in June and December.

5. The following will be the subjects of examination, and the maximum number of marks for each subject:—

* Arithmetic, including vulgar and decimal fractions, and square and cube roots	-	-	-	250
* Orthography	-	-	-	100
* Handwriting	-	-	-	100
* Reading	-	-	-	100
* Grammar	-	-	-	100
* English composition	-	-	-	100
Geography	-	-	-	100
Translation of French into English	-	-	-	150
* Euclid, first six books	-	-	-	300
* Algebra, including quadratic equations	-	-	-	300
Total	-	-	-	<u>1,600</u>

6. Candidates will be subjected to a preliminary examination in the first three subjects, and should they fail in any of the three they will be at once rejected. Those possessing a competent knowledge of the above subjects will be appointed to existing vacancies in the factories according to the number of marks gained; and those who do not succeed at the first examination will be allowed a second trial, if not over age; but they must apply to the superintendents for a second nomination.

7. Engineer students will be employed in the factories for a period of six years with a view to their becoming naval engineers, if, on examination at the end of that time, they are found to possess the necessary qualifications. In the course of the six years they will be employed in the fitting and erecting shops, and will attend in the drawing office, the foundries, the smitheries, and other shops, to acquire a general knowledge of the work done in them. They will also attend at the dockyard school two afternoons and two evenings in the week to pursue such studies as may from time to time be determined on. Means will also be afforded them of acquiring the groundwork of the knowledge required by a naval engineer, respecting the working of marine engines and boilers, the practical use of the various instruments used in the engine-room, including the indicator, and of becoming generally acquainted with the duties of a naval engineer.

8. Engineer students will be examined twice a year by the director of education, on the second Mondays in July and December, and the marks obtained for these examinations will cumulate up to the final one for entry as assistant engineer. The final examination will embrace—

The subjects mentioned in paragraph 5	-	-	-	1,600 Marks.
* Plane trigonometry	-	-	-	150 "
* Hydrostatics	-	-	-	100 "
* Mechanics	-	-	-	200 "
Dynamics	-	-	-	100 "
Elementary chemistry	-	-	-	100 "
* Properties of steam	-	-	-	100 "
* General good conduct and industry	-	-	-	300 "
Total	-	-	-	<u>2,650 Marks.</u>

9. Engineer students must gain 1,150 marks before they obtain a certificate of qualification. These numbers must include at least half of the numbers allotted to the subjects marked with an *. The certificates will be of two classes. To obtain a first-class certificate a student must gain 2,000 marks, which must comprise three-fourths of the numbers in the subjects marked. A first-class certificate will be regarded, in respect of promotion, as equal to one year's sea service. The chief engineer and inspector of machinery will also examine the engineer students twice a year as to their progress in practical studies, and no engineer student will be entered in the navy until the chief engineer certifies that by his skill as a workman, his knowledge of steam machinery, and his good and steady conduct, he is fully qualified for the appointment of assistant engineer.

10. Engineer students who may fail to attain the required standard for the scholastic examination at the end of six years will be allowed to present themselves a second time at the next half-yearly examination of the director of education; if they fail to obtain their certificates at the second examination, they will cease to be eligible for the naval service.

11. The weekly pay of engineer students will be 8s. during the first year of their training, and if they are reported deserving by the chief engineer and inspector of machinery it will be increased 2s. a week each year until the sixth, and then increased 8s., making their wages 24s. a week for the last year.

12. The most intelligent of the students will be eligible for a more advanced education at the School of Naval Architecture, in accordance with the regulations contained in the Admiralty circular of the 17th June 1864.

Admiralty, 1st August 1867.

Regulations under which Engineering Students and Apprentices are admitted to the Royal School of Naval Architecture.

Admiralty, 17th June 1864.

My Lords Commissioners of the Admiralty, having decided to adopt measures for imparting to some of the most intelligent of the dockyard apprentices and engineer students a more advanced and liberal education than the present dockyard schools are capable of furnishing, have arranged, in conjunction with the Committee of Council on Education, to establish a school of naval architecture for the training of naval architects for private as well as for the public service. The school will be situated at South Kensington, and will be under the management of the Committee of Council.

The Admiralty pupils will be selected chiefly from the dockyards by competitive examination, the detailed arrangements for which are set forth below. Six months of each year, viz., from November to May, will be devoted to study at the school, and the remaining six months to actual work and the acquirement of practical knowledge in the dockyards. While students are away from their yards they will be granted a subsistence allowance of 3s. per diem in addition to their wages.

My Lords anticipate that this school will be the means of supplying a staff of highly efficient officers for the dockyards, and engineers for the navy; but it is to be distinctly understood that promotion in the service will be made to depend solely on the ability and good conduct which the students may be found to exhibit in competition with others after the completion of their education at the school.

By command of their Lordships,
C. PAGET.

1. The examinations will take place every year, commencing on the first Tuesday in July, and extending over four days.

2. All shipwright apprentices who have served not less than four years, nor more than six years, and all engineer students who have served not less than three years, nor more than five years, will be eligible for selection *after* the present year; and *for* the present year all shipwright apprentices who have served four years, and all engineer students who have served three years, will be eligible.

3. The subjects of examination and number of marks assigned will be as follows :—

<i>Pure Mathematics</i> , including arithmetic, mensuration, plane and descriptive geometry, plane trigonometry, and elements of the differential and integral calculus	2,500
<i>Applied Mathematics</i> , including mechanics and hydrostatics	1,000
Practical shipbuilding, including laying off (for shipwright apprentices only)	2,500
Practical marine engineering (for engineer students only)	2,500
French	500
Elements of physics and chemistry	750
English grammar and composition	750
Geography and history	750

4. The questions for the examination in ship building and marine engineering will be prepared by the Controller of the Navy, and those in mathematics, &c., by Dr. Woolley, and will be forwarded by the Controller of the Navy to the dockyards the day previous to that on which the examinations are to be held.

5. The questions, with the answers of the several apprentices and engineer students, are to be transmitted to the office of the Controller of the Navy as soon as the examinations have been completed, for the purpose of being valued.

Note.—The number of pupils to be entered in the present year, 1864, will be—

8 shipwrights, and
8 engineer students.

LONDON :

Printed by GEORGE E. EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty.

For Her Majesty's Stationery Office.

FRENCH MINISTRY OF AGRICULTURE, COM-
MERCE, AND PUBLIC WORKS.

COMMISSION

ON

TECHNICAL INSTRUCTION,

APPOINTED BY

Imperial Decree, 22nd June 1863.

ABSTRACT OF EVIDENCE TAKEN BEFORE
THE COMMISSION.

Presented to both Houses of Parliament by Command of Her Majesty.



LONDON:

PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.
FOR HER MAJESTY'S STATIONERY OFFICE.

P R E F A C E.

THE translation of the Report of the Commission on Technical Instruction appointed by Imperial decree on the 22nd June 1863 has already been presented to Parliament. The present volume contains an abstract of the evidence given by various professors, heads of colleges and schools, and manufacturers, before the Commission. In a third and concluding volume will be published the Report of a Sub-commission appointed to inquire into the condition of technical education in Germany and Switzerland, together with programmes and accounts of different schools and societies in France, on which the Commission had not received detailed information in the evidence.

A second Sub-commission had also been appointed to examine into the state of technical education in England, but as its report is foreign to the object of the present volume (which is rather to give information of what is being done on the Continent), the very short Report of this Sub-commission has not been translated. It should be noticed also that the Report on Germany is very extended, and contains detailed notices of the condition of primary education, with minute descriptions of the schools, and in the translation which will be found in the last volume it has been considerably condensed. The programmes and accounts of the French schools are also given with some diffuseness, and it has been thought advisable to publish only an abstract of them.

CONTENTS.

ABSTRACT OF EVIDENCE.

	PAGE
Evidence of M. MONJEAN, Director of the Municipal College at Paris -	1
Evidence of M. MARGUERIN, Director of the Turgot Municipal School at Paris - - - - -	6
Evidence of M. BAUDIME, Assistant Superior of the Christian Brothers' School, Paris, and of M. VICTORIS, Member of the same order -	22
Evidence of M. POMPÉE, Founder of the Technical School of Ivry, Principal Director of the Turgot Municipal School, late member of the Superior Committee of Elementary Instruction for the City of Paris, Vice-President of the Polytechnic Association - - -	29
Evidence of M. A. DELAHAYE, Director of the Technical School of Batignolles, and Member of the Council of Head-masters of the Department of the Seine - - - - -	37
Evidence of M. BARDIN, Professor of Industrial Drawing to the Communal Schools of the City of Paris - - - - -	40
Evidence of M. MEYER, Protestant Minister in Paris, Ecclesiastical Inspector, President of the Apprentice Society of the Church of the Confession of Augsburg at Paris - - - - -	55
Evidence of MM. GAUMONT and GUÉMIÉ, Editors of the Journal of Technical Education, Paris - - - - -	58
Evidence of Mdlle. HAUTIER, Directress of the Municipal School of Drawing in the Rue Nôtre-Dame-de-Lorette, Paris - - -	63
Evidence of Mdlle. MARCHEF-GIRARD, Directress of the Professional School for Young Girls, Rue De-la-Perle, Paris - - -	65
Evidence of M. MAIGNEN, Member of the Society of Saint-Vincent-de-Paul, Director of the Mission of Saint-Vincent-de-Paul, Paris -	67
Evidence of M. DE COMMINES DE MARSILLY, President of the Industrial Society of Amiens (Somme), and of M. S. FERGUSON (junior), Vice-President of the Industrial Society of Amiens (Somme) - -	71
Evidence of M. LEQUIEN, (senior) Director of the Communal School of Drawing in the Rue Ménilmontant, Paris - - - - -	78
Evidence of M. BERNOT, Director of the School of Industrial Arts and Mines at Lille - - - - -	81
Evidence of M. NOYON, Councillor of the Prefecture of the Seine, Director of the Municipality of the City of Paris - - - - -	84
Evidence of M. THUNOT, President of the Council of Prud'hommes, Paris - - - - -	85
Evidence of M. BADER, Director of the Technical School of Mulhouse (Haut-Rhin) - - - - -	87

	PAGE
Evidence of M. GIRARDON, Director and Founder of the Central School at Lyons, Professor at the School of La Martinière, Lyons - -	95
Evidence of M. J. J. BOURCART, manufacturer at Guebwiller, founder of the popular courses of lectures at Guebwiller (Haut-Rhin) - -	105
Evidence of M. LELOUP, Honorary Director of the Upper Technical School of Nantes - - - - -	105
Evidence of M. ROSSAT, Doctor of Science, Head-master at Charleville (Ardennes) - - - - -	111
Evidence of M. MALLET, Superior Officer, Professor at the Imperial Artillery Schools, Douai (Nord) - - - - -	117
Evidence of M. A. GROS, Member of the Legislative Body, manufacturer at Wesserling (Haut-Rhin) - - - - -	122
Evidence of M. KERN, Minister at Paris of the Swiss Confederation, formerly President of the Council of the Federal Polytechnic School at Zürich - - - - -	124
Evidence of M. GOUIN, Civil Engineer, Paris - - - - -	125
Evidence of Mme. PELLEPORT, Directress of the Upper Municipal School, Passage Saint-Pierre, Paris - - - - -	128
Evidence of M. HOUEL, Director of the Derosne establishments of Cail & Co., Paris - - - - -	129

TECHNICAL INSTRUCTION.

ABSTRACT OF EVIDENCE TAKEN BY THE IMPERIAL COMMISSION.

Evidence of M. Monjean, Director of the Chaptal Municipal College at Paris.

THE object of the education given at the Chaptal College is to prepare the pupils for commercial, industrial, agricultural, or artistic pursuits. The school course extends over six years, of which the first four are devoted to instruction of a purely special or professional character, for pupils who cannot afford to give up a longer time to school-work. The course of study of the other two years is of a higher character, and is followed only by students who are to occupy higher positions in commerce, industry, or agriculture, or who aspire to the diploma of Bachelor of Science, or who desire to enter the Central School Arts and Manufactures (*École Centrale des Arts et Manufactures*), the Polytechnic School (*École Polytechnique*), the Superior Normal School (*École Normale Supérieure*), or the School of Fine Arts (*École des Beaux Arts*). Two-thirds of the pupils, who have passed the first four years' course, enter on the superior one, and the number who do so is annually increasing. There are now 90 students who attend the fifth year course. In 1862, 14 pupils of the college presented themselves for examination at the Central School, and all passed. Three out of five passed for the Polytechnic, and two were made serjeants. Three gained honours in the science division of the Upper Normal School, and an old pupil of the college having passed the Normal School, was first in the examination for the licentiate in mathematical science. Out of twenty candidates from the college fourteen passed the examination for Bachelor of Science.

Course of
study at the
Chaptal
Municipal
College.

The study of Latin is compulsory, commencing with the third and terminating with the fifth year of the school course. There are only two classes a week, and the pupils beginning it are about 14 years old. With this small amount of instruction in Latin, however, the pupils are enabled to pass the examination for Bachelor of Science, which as far as

Study of
Latin.

regards the Latin language, is, with the exception of verse composition, the same as that for Bachelor of Literature (*Bachelier ès Lettres*).

Statistics of
the College.

The number of pupils at the college amounts to 950, of whom 600 are boarders and 350 day pupils, and this number would be increased if there were room: at present many pupils are refused every year.

As at the Lycées pupils are admitted to the college at nine years old. The large demand for admittance is due to the great development which has been given to literary, without losing sight of a more practical education. Both parents and students attach great importance to those courses of study which have no special reference to any particular examination or to any definite pursuit; thus the courses of the history of literature and of political economy are attended by pupils going up to the higher schools, though they do not form part of the list of subjects required in them.

There is no special instruction for apprenticeship (*enseignement spécial d'apprentissage*), for which, in M. Monjean's opinion, with the exception of agricultural schools, the work-shop is the best school.

Financial
position.

The financial receipts of the college amounted in 1863 to 780,000 francs, giving an average of 821 francs per pupil. Thirty half-scholarships (*demi-bourses*) for boarders, and thirty scholarships for day pupils, have been established by the city of Paris. Each boarder pays the sum of 1,050, 1,100 or 1,200 francs, according as he belongs to the lower, middle, or upper college, and each day pupil 250 francs for the lower course and 350 for the upper. The Chaptal College was founded in 1844 by the city of Paris, but the building then erected serves now only for the middle college; the private resources of the establishment have sufficed, though with difficulty, for extending it to its present dimensions. In 10 years 1,000,000 francs have been expended in building and in buying land, and at present the college is free from debt, and the receipts exceed the expenditure by a sum of 70,000 francs.

Opinion of
M. Monjean
on the con-
dition of
technical
education in
France.

In giving his general views on the subject of special or professional education in France, M. Monjean states that the country possesses more of the elements of its further development than is generally supposed. Already twenty-five years ago, the city of Paris founded the professional schools of Chaptal and of Turgot. The object in founding the former was to give to the children of the middle classes a training for commercial and industrial pursuits which a classical education could not afford, and in founding the

latter to give to the children of the lower middle classes an education superior to that of the primary schools, and one fitted to give increased value to their intellectual and manual labours. At the same time it must be understood that the instruction at these institutions is of a general and not of an exclusively practical character, and by this means M. Monjean is of opinion that the city of Paris is in advance of the educationists of Germany.

M. Monjean's observations on the results of the Practical Schools (*Real Schulen*) in Germany, have led him to the conclusion that the prevalence of an instruction purely practical, and based entirely on the applied sciences, has directed the attention of young men exclusively to subjects of self-interest and immediate profit, and has quenched the generous aspiration which sees in life something else than mere profit to be realized; the moral in fact is sacrificed to the mechanical man. Moreover, though the German practical schools have produced such moral results, they have not obtained for industry and commerce the objects they had in view. On this point practical experience has given decisive evidence. Some merchants of Cologne and of Magdeburg having selected from the practical schools and the gymnasias a certain number of young men of equal intelligence and capabilities, placed them at the same kind of work; for a short time the pupils who had been brought up at the former schools maintained a certain degree of superiority, but when they had been submitted to a longer period of probation it was found that they were beaten by the pupils of the gymnasias, who having received a more general and intelligent education, were better adapted for all pursuits to which they might be called. Besides, crude ideas of socialism have developed themselves among the young men brought up at these practical schools, a political danger which M. Monjean considers the Government and the Commission will not fail to appreciate. A further proof of the correctness of M. Monjean's opinions on this point, is that as he states the Governments both of Prussia and of Austria have determined to retrace their steps, and under the name of Practical Gymnasium (*Real-gymnasium*), to introduce a number of schools which shall give greater importance to general and literary studies.

M. Monjean was requested to give a description of education in Germany. He states that as regards professional, or rather technical education, Germany has still a great deal to do: there is a considerable hiatus between the primary education and the higher instruction of the universities.

Practical
Schools of
Germany.

Technical
education in
Germany.

All the children in Germany are compelled to go to the primary schools, and those who quit them at the age of 12 years must attend the courses given in the Sunday school. This compulsory system has, however, not been introduced without some difficulty, and, in some states, penal statutes have actually been found necessary; it is also found that working men often lose the desire for self-instruction in consequence of having had to submit to compulsion in their youth; they have not the eagerness for learning which characterizes the French working classes.

Various
Polytechnic
Institutions in
Germany.

The necessity for establishing a system of technical instruction has been widely felt throughout the whole of Germany. The government of Würtemberg is building a polytechnic institution which will cost 1,400,000 francs, where the annual fee for the course of instruction is not to be more than 15 francs. One of the best organized and best attended polytechnic institutions is at Carlsruhe, and there is one of the same sort at Prague. The Polytechnic School at Vienna has fallen from five hundred students to one hundred, and the Austrian Government is now occupied with its re-organization and improvement. In efficiency and perfection of instruction no German school comes near the Central School and the Conservatory of Arts and Trades at Paris. The great defect of the Polytechnic Institutions in Germany, as well as of that at Zürich, is that the pupils are at liberty to follow any course of study they please; some are earnest and industrious, but a great number lead an idle and dissipated life. Another fault is that in the German schools residence is not required. The large French schools have established a clearly defined system of instruction, compulsory on all and leading to a diploma. This forms a stimulus to young men which nothing else can replace, and is one of the causes of superiority of the Central School in Paris over all similar institutions in Germany.

Views of
M. Monjean
on what can
be done to
extend and
develop tech-
nical edu-
cation in
France.

The following are M. Monjean's ideas on the means necessary to extend professional or, as he would prefer to call it, technical education in France. He says:—"Develop
" primary education, which is no longer equal to the wants
" of the country, by introducing into it the elements of
" natural and physical science; establish on a broad basis
" agricultural and trade schools; increase the number of
" teachers for adult instruction, not by the direct interven-
" tion of the State, but by enlightened and systematic
" encouragement; found in all the important commercial
" and industrial centres (and that by inviting the co-operation
" of the municipalities, of public societies, and of private

“ individuals), schools specially adapted to the wants of
 “ each locality.”

With regard to schools established by large industrial manufacturers in connexion with their works, and for the benefit of the workpeople and their children, M. Monjean believes that such institutions produce the greatest good, not only from an educational point of view, but also as tending to draw closer the bands that unite the employer and the employed. To convert, however, these schools, which owe their origin to private liberality, into Government establishments, would endanger the good which they do, and weaken their moral power.

Schools in
 connexion
 with large
 manufacturing
 establishments.

It is of the greatest importance, both to the Government and to society, to give to the artizan an instruction which, while elevating his intelligence and increasing his resources, will enable him to add considerably to his wages. For such a purpose nothing can be better than the lectures given at the Conservatory of Arts and Trades, than those held by the Polytechnic and Philotechnic Societies, and than the gratuitous courses of lessons in drawing. The school founded by the chamber of commerce in the Rue Trudaine is another example; a fee of three francs per month admits to the evening lectures, and more than a hundred and fifty artizans, apprentices, or small clerks, have entered their names on the register of attendance.

Evening
 classes for
 adults.

In reply to the question whether such educational institutions for adults should be undertaken by the State, the municipalities, or by private individuals, M. Monjean replied that in his opinion such establishments owe their authority with the public chiefly to their municipal character. The municipalities are better patrons than the State, because they permit persons in whom they place confidence to take the initiative; if any fault is discovered the remedy is rapidly applied, and there is no reason to fear that endless administrative dilatoriness, which paralyses everything, because it pretends to regulate everything.

Nature of the
 governing
 body under
 whom courses
 of lectures for
 adults should
 be placed.

It is to be regretted that so many private efforts in the same direction have not met with the success which they deserve, and it should perhaps be an object to the Government to second such efforts, not by a direct patronage, which would be a clog, but by every facility which it could put in their way. It is greatly to be doubted whether the College Chaptal could have attained its present success if it had been founded by merely private action; the question whether it could now maintain its position if left to its own resources is one which need not be considered.

*Evidence of M. Marguerin, Director of the Turgot
Municipal School, Paris.*

Social position
of the children
who attend the
Turgot School.

The system of education at the Turgot School is more immediately adapted to the lower middle class: the parents of the children who frequent it are either workpeople who carry on small manufactures at their own houses, small retail tradesmen, inferior employés in large public and private companies (as for example the railway companies), foremen, chiefs of workshops, and the more skilled artizans. Parents also in a higher commercial and industrial position send their children to the school, preferring the more general and practical education which it affords to that which can be obtained at the Lycées: on the other hand through the scholarships maintained by the city of Paris, the school has a number of children whose families belong more strictly speaking to the artizan class. These two groups form about two-sevenths of the whole number of scholars, of whom there are in all 740.

Scholarships.

There are 94 scholarships maintained by the liberality of the city of Paris at the Turgot School. Every year a general competitive examination among the pupils of the lay and ecclesiastical communal schools takes place at the Hôtel de Ville. The school is thus able to raise a considerable number of pupils belonging originally to the artizan class to a higher social position, and to enable them after attending the Schools of Arts and Trades and even the Central School to become accountants and superior clerks.

Character of
the instruc-
tion.

The regular course of the school occupies three years, preceded by a preparatory and succeeded by a supplementary year. The preparatory year is not compulsory, but the greater part of the pupils go through it, finding themselves not sufficiently advanced for the examination for admission to the first year of the regular course. The supplementary or fifth year's course is not attended by a great number of pupils, not more in fact than 20 at present. This course is intended for the children of parents in more easy circumstances and for those pupils who possess more remarkable capabilities. In the complementary year special objects are pursued; the young men who attend the course, and who are there from 16 to 18 years old, pass, some into the Central School, some into the School of Fine Arts; many prepare for the examination of surveyor of bridges and roads (*Conducteurs des Ponts et Chaussées*), others again return to their parents, whose business they are to follow, such as joiners, carpenters, locksmiths, surveyors, small contractors,

and manufacturers. It is important that pupils like these should have a knowledge of descriptive geometry with its application to stonework and carpentry, and also of architectural and machine drawing, and that they should be practised in the manipulation of the school laboratory; the theory which has been studied will aid and improve practice and shorten the time of apprenticeship.

Children can scarcely enter the Turgot School before the age of 12 years, the greater number of them having been obliged to pass through the preparatory year; but often children of 13, 14, or even 15 years present themselves for admission, and then with so little acquired knowledge, so few habits of industry, and an intellect so badly trained that it is impossible to admit them directly to the first year of the regular course. Primary instruction, whether private or communal, and especially the private, is far from giving the results expected of it. The Turgot School and other schools of the same description ought to have elementary classes where the primary instruction given by numerous and well trained teachers would really be completed at the age of 12 years. As it is, many of the pupils having arrived at an age to enter business are compelled to leave the school before their studies are finished. In the question of purely technical schools this consideration is one of the highest importance. If a boy has finished his primary education at 12 years old he can receive a good secondary instruction between the ages of 12 and 15, and then it is not too late for him to enter upon an industrial apprenticeship, whether it be in a special mechanical or weaving school (*école de tissage*), or in a laboratory or in a workshop, and he will have been so well prepared for this special apprenticeship that the customary time will certainly be diminished. If a pupil leaves the secondary school at too great an age he tries at once to get a situation in an office; it is well known what obstacles and discouragements he will meet with in this course.

Age of admission to the Turgot School.

The fee at the Turgot School is 15 francs per month, in which is included all school necessities except books; and this fee, though comparatively a high one, has not hindered the success of the school. It should be noticed that there are already more than 200 children at the school beyond its capabilities, the building having been originally intended for 500 pupils only. Notwithstanding this, however, it is impossible to admit all the children that present themselves. Thus in October 1863, 100 pupils were rejected for want of space, and of these more than 80 have renewed their appli-

Number of pupils at the school.

Destination of
the pupils.

cation for admission in January 1864, although they are aware that there are scarcely ten vacancies. In two years' time the school could easily number 1,200 pupils, supposing there were space for them, especially if the number of divisions in the upper school were increased and if elementary classes were established. To the pupils of the Turgot School nearly all professions are open which do not absolutely require classical studies at the Lycées. Commerce and manufactures naturally draw the greater number of pupils, commission and banking businesses also receive several, the rest distribute themselves among the industrial arts, the building trades, the bridges and roads (*Ponts et Chaussées*), and railway companies. Only a few enter the Schools of Arts and Trades because it is not intended that the Turgot should be a special preparation for these schools. Much information on the destination of the pupils of the school can be obtained from the year book of the Friendly Society of the old pupils of the Turgot School (*L'annuaire de l'Association Amicale des anciens Elèves de l'Ecole Turgot*). Every year about 150 pupils leave the school and easily obtain situations. In the month of August, at the end of the scholastic year, demands for employés from the heads of commercial and industrial establishments are most frequently made, and in this way in 1863 more than 100 pupils found situations within a period of two months; the others were provided for by their families or remained at home to work in their fathers' business.

Course of
study.

The instruction at the Turgot School is divided into three courses of study; the first comprises mathematical and physical science, the second the graphic arts (*les arts graphiques*), the third, religious instruction, history and geography, and the French, English, and German languages with their respective literatures. Under mathematics are comprised arithmetic, plain and solid geometry, algebra to the binomial theorem, plain trigonometry, the elements of analytical geometry and descriptive geometry. The course of elementary physics and mechanics commenced in the second and third year is completed in the fourth. Chemistry which is learned for three years comprises both inorganic and organic chemistry as well as the elements of analysis. Under natural history is included physiology, zoology, botany, mineralogy, and geology, with their principal applications to the industrial arts.

Mathematical
and natural
science.

Graphic art.

In the course of graphic art are comprised artistic and geometrical drawing. Artistic drawing is restricted to ornament, time being wanting for the drawing of the figure. The

students draw from lithographed copies, as well as from the cast; some are instructed in modelling. Geometrical drawing extends from the tracing of curves to the drawing of buildings and machines, theoretical as well as practical, so that the pupil who has attended the course, has a good knowledge of projections and the penetration of solids. In the graphic arts is also included caligraphy, which is of great importance in a school; the pupils are practised in different kinds of writing until they leave school.

The studies of the third group constitute what may be called the humanities. Religious teaching is both historical and dogmatic. The historical instruction passes rapidly in review ancient history, and enters with more detail into the history of the middle ages and of modern times, special attention being paid to the history of France, and those economic facts on which it is so important that students should have correct and precise ideas. The course of literature, which comprehends style, composition, and the great epochs of the history of literature, is founded upon the principles of logic and moral truth. As the course of study includes neither Greek nor Latin it has been found necessary to invent other methods of instruction to enable the pupils to obtain a correct knowledge of the French language.

Language and literature.

Besides these three groups of studies there is the study of accounts which is a specialty in the school and amounts almost to a practical apprenticeship. It is distributed over the three years of the regular course, and comprises the elements of commercial arithmetic, and the keeping of books and accounts, with the theory of exchanges and arbitrations.

Accounts.

It is an object to make the education of the school as general as possible, it is therefore at the same time both theoretical and practical: theoretical without being speculative, for the studies have to be applied; and practical, for by that it is distinguished from the education of the Lycées. All the courses of the school are compulsory on all the students; it is found impossible to divide them into groups destined for special professions. It is impossible to dictate to a child of 12 years without knowing his capabilities, the amount of his intelligence, or his habits of industry what should be the profession he should adopt, without exposing him to numberless mistakes and disappointments. But when a youth has received an education of a more general character it is comparatively easy for him to adapt himself to any circumstances in which he may be placed.

General character of the education.

M. Marguerin is not of the same opinion with M. Monjean as to the direction under which such schools

Nature of the direction under

which such schools should be placed.

should be placed. He believes that schools like the Turgot School, meeting the requirements of the middle-classes, would have a like amount of success, whether under the direction of the municipalities, the chambers of commerce, or the industrial societies, or whether they had been founded by private individual enterprise; but always on condition that they might have full liberty of action to choose their own masters, to extend or limit their courses of study, and to adapt themselves to the wants of the industries of the localities in which they are placed.

Financial statement of the Turgot School.

The Turgot School is self-supporting, both the receipts and the expenditure amounting to 113,000 francs, but there is no charge for rent nor for building repairs. For a long time the school was a charge to the city of Paris, and now the number of pupils is considerably in excess of the room at its disposal. Should that be decreased to the normal maximum by the division of classes and by the establishment (as is intended) of other Turgot schools, which will be sure to take many of the pupils who now come from the distant parts of Paris, it is not probable that the receipts would cover the expenditure under the present organization of the school.

Pecuniary aid more necessary in metropolitan than in provincial schools.

M. Marguerin considers that if a school of this description requires external assistance when established in Paris it is not so likely to need pecuniary aid when founded in the provinces. With 740 pupils, as at the Turgot School, the relations of the school with the parents of the children, with commerce and industry, with former pupils, with the governing body, will require a costly and numerous staff, which cannot participate in the instruction of the school. With 300 pupils this staff may be less, and its members can take part in the active instruction. A less sum would also suffice for the annual expenses in the purchase of tools, mechanical instruments, and collections of physical apparatus. On the whole M. Marguerin concludes that a provincial school which could, considering the less number of its scholars, adopt a different organisation to that of the Turgot School, besides reducing its educational staff, where the parents would provide scholastic necessities, or where the school fee might be higher than it is in Paris, would not only be self-supporting but might even yield a revenue. The necessity for school buildings and for the payment of rent is another reason for making it desirable for technical schools to have the assistance of the different towns, chambers of commerce, and industrial societies.

Manual labour in industrial schools.

M. Marguerin is not of opinion that the introduction of manual labour into technical schools would be productive of

any practical benefit. He considers that one of the great advantages of the system of education established at the Turgot and other schools of the same description is that the pupil has completed all his more important studies before he is too old to enter upon his apprenticeship. In order that the pupil might undergo a course of manual labour at school he would be compelled to sacrifice some of the more important branches of general education, which the teacher finds to be so useful in the training of his pupils. It is a common argument to refer to the professional school at Mulhouse, but it must be borne in mind that the manual labour in that school is confined to two hours of joiner's work in the week, and that this labour is considered more as an athletic exercise than as a preparation for apprenticeship; also, that the mechanical workshop, the chemical laboratory, the school of design, and the weaving workshop, which form a part of the Mulhouse School, only take in pupils after they have received several years of general instruction. It would in every way be better that such workshops should be distinct and independent, and should be formed into special forms of apprenticeship, open equally to the son of the workman and of the manufacturer.

M. Marguerin having heard the industrial schools of England much spoken of, where the pupils learnt a little theory in the class-room, and much practice in the workshop, visited that country for the purpose of forming his own opinion upon the subject. He found that the idea of the English schools entertained in France is a wrong one. It has been the habit there to regard as industrial schools the Ragged and Reformatory schools, which are, in fact, rather houses of correction, where are confined the children of the lowest class of the population, already branded by vice or condemned for theft; criminals, in fact, whom it is attempted to wean from a life of misery and degradation. These schools have been founded for the dangerous and not for the working classes of English society. It is their object to inculcate some notions of religion and virtue into children prematurely vicious. Their inmates are taught the elements of primary instruction, and some trade that may enable them, when they are reformed, to gain their own livelihood. Thus, at the Norwood School the boys have the care of all the repairs of the house, the carpenter's, the locksmith's, and the painter's work. They make the clothes and the shoes; they tend the cattle and cultivate the kitchen garden. The girls do the washing, mend the linen, and occupy themselves in the kitchen and

Industrial
schools
England

Schools in connexion with the large manufactories in England.

Secular schools.

household. They leave the schools to enter into service, while the boys become workmen and labourers. It is not that in England no attention is paid to the great question of instruction adapted for the middle and the working classes; but it is not attempted to bring the workshop into the school, on the contrary it is the school which is attached to the workshop. Everywhere in large manufactories classes are founded, maintained, and watched over by the employer himself. In towns the schools best adapted to the wants of the middle class are those called secular schools, because they abstain from all religious dogmatism, and are content to give a general education. These institutions have great analogy with the Turgot School. The force of circumstances in the two countries has led nearly to the same devices to satisfy the same wants. The great obstacle to the development of secular schools in England is that sectarian spirit which will not permit an educational establishment to leave the care of religious instruction to the parents, and to hold itself aloof from every denomination. As regards manual labour associated with instruction or apprenticeship brought into the school, it is an idea quite contrary to English notions, and one which they regard almost as a chimera.

Condition of the educational question in England.

England has long been occupied with the great question of middle and working class education; the development of instruction and its application to the wants of agriculture, commerce, and manufactures could not be neglected in so liberal and practical a country. Everywhere in England classical instruction is made to give way to what is called modern education. This modern education consists in the study of the physical and mathematical sciences, history, and political economy. One of the most important results of this movement is the foundation of the University of London, which represents more especially the scientific wants of the age and which was established as a rival, so to speak, of the old Universities of Oxford and Cambridge—the representatives in its purity of the old fashioned classical education. The same spirit which gave rise to the University of London has determined the foundation of great establishments for secondary instruction, whose system should meet the requirements of the examinations and the diploma of the new university. Thus in London itself King's College and the City of London School, as well as the old foundations of the city corporations, the Merchant Taylor's and the Brewers, may be cited as examples. In all these institutions by the side of the classical divisions where Latin and Greek form the basis of education, a modern

Middle-class schools.

division has been established in which the mathematical and physical sciences and modern languages take the lead of or even replace Latin. These modern divisions have a great analogy with the scientific divisions established in the French Lycées and Colleges, or with the divisions of special instruction, commonly so called, which have hitherto languished and which it is now proposed to re-organize under the new and little appropriate name of *professional instruction*.

These English schools are rather intended for the richer Grammar portion of the middle class; below them come the institu- schools. tions which are called Grammar Schools. The numerous grammar schools were mostly founded during the reigns of Elizabeth and Edward VI., that is to say, the period of the reformation. They have had different fortunes, some of them, as Harrow, Eton, and Rugby, have made for themselves European reputations, and having attracted principally the upper classes of society have assumed almost an aristocratic character. At these schools classical instruction remains in full force; but a great number of the other grammar schools, frequented by students of the middle class, are already in course of transformation, by superseding the study of Latin and Greek by a more modern instruction. They cannot, however, completely do so, because they are bound by their ancient charters of foundation. Some of them, not to be false to their charters, continue to give instruction in Latin to perhaps 20 or 25 pupils, the remaining two or three hundred receive modern instruction in the sciences and the living languages.

By the side of the grammar schools there exist two other kinds of institutions—*private schools* (in great number and of every degree) and *proprietary schools*. These latter are founded by a sort of joint-stock company and are administered by the shareholders themselves, not as a profitable speculation, but with the object of securing for their children an education suitable to their position in life. Of course proprietary schools do not give a purely classical education; they maintain also an instruction adapted to the wants of manufacture and commerce. It is the same in a still higher degree in the mass of private schools which exist in England. For a long time the absolute freedom of education has produced a number of private establishments, so bad in every respect that private schools no longer enjoyed a good reputation with the public. Some years ago several of the principals of private schools formed themselves into a society, which they call the College of Preceptors, with the

object of securing for their profession public consideration; they have obtained a charter, by virtue of which the principal of every establishment who enters the union, for the purpose of obtaining the benefit of a moral guarantee with the public, is required to pass an examination and to submit himself to certain obligations. Thus in all the institutions which have been mentioned modern education is more or less replacing the long established classical education, notwithstanding that custom and tradition have gained for the study of the ancient languages a greater prestige in England even than in France.

Secular
schools.

The *Secular Schools* owe their foundation to the same spirit which has given rise to what is called the Manchester school of politics; they are called secular schools because they secularize instruction so to speak more than has hitherto been the case in England, by excluding from it all dogmatic religion—a great innovation in a country where religious questions have so much influence. Notwithstanding that these schools had at the very outset to encounter the antagonism both of the Established Church and of the Nonconformist sects, they have succeeded better than a great number of other institutions, because they respond to a national requirement. Already in England there are more than thirty such schools. Of course Latin and Greek are altogether excluded from the course of instruction of the secular schools, and are replaced by the mathematical, physical, and natural sciences, modern languages, history, and political economy. It is not, however, in the subjects of instruction alone that innovation has been made; the secular schools are distinguished no less for the improvement which they have effected in the method of teaching than for the spirit which has placed them above all religious dogmatism.

M. Marguerin considers that instruction in England is inferior to that in France, in that it addresses itself less to the intelligence and to the reasoning powers than to the memory. One of the objects of the secular schools is to break through the traditions and customs of English teaching; their methods of instruction are more free, and more fertile of results. They practise and sharpen the intelligence; they aim at the general development of the intellect by directing it to the practical, and by training it to comprehend the conditions of modern society.

Result of
modern edu-
cation in
England.

This natural tendency of the middle classes to get rid of the classical and to seek for an education better adapted to their wants, has produced a remarkable and not unimportant result. The old universities of Oxford and Cambridge,

those sanctuaries of classical study, have been aroused ; they have desired to guard themselves against the rivalry of the more recently established University of London. They have organized what they call middle-class examinations, by which they hope to retain their influence over the young generation. These are a sort of examination for a degree : the subjects are numerous, but the candidate chooses what he will take up.

The movement in favour of popular education, that is to say, primary education, in England dates from the year 1825, and the progress which it has made is due principally to the exertions of private associations. The two most important of these are the British and Foreign and the National Societies, then come the Home and Colonial Society, the Wesleyan Schools Society, the Poor Catholic Schools Committee, the Ragged Schools Union, etc. The action of these societies has consisted in organizing everywhere primary instruction, in arousing public opinion, in aiding in the erection of school buildings, in training masters, and in publishing books ; they aim, however, only at general and primary instruction, not at technical or special. But the public requirements were so great that the efforts of the societies alone were unable to meet them, and the State was compelled to come to their relief. A sub-committee of the Privy Council was formed, to which the care of national education was entrusted ; it is called the Committee of Council on Education. The committee negotiates directly with the societies, and makes grants, subject to certain conditions in the erection and management of the schools, and to the obligation of their receiving the visits of the inspectors. Thus the Government says to the societies, " I will give you money, but I will inspect your schools ; I will verify your results, and I will withdraw or increase the grants according as those results are satisfactory or not." The societies then do not found schools themselves, they place themselves in connexion with local committees, which are spontaneously formed in the different towns and villages, and they are aided partly by the grants received from Government and by private subscriptions. When the school is founded the society places at the disposition of the local committee a master trained in one of its normal schools ; in fact it is by their normal schools that the societies have been able to regenerate, improve, and develop primary instruction. The normal schools are often handsome and large edifices, admirably arranged ; they generally have in connexion with them practising and model schools.

Tendency of
primary to
develop into
secondary
education.

Thus the societies have constituted a vast system of primary instruction, which is the first step towards popular education; afterwards, by the force of the same circumstances, the primary schools have entered upon the domain of professional, or rather, to speak more correctly, industrial education; they have a tendency to overstep, they have, in some instances overstepped the limits of primary instruction, and have arrived at what in France is called superior primary education. The English understand that this is in reality an industrial education, general it is true, and not technical but nevertheless very practical and particularly useful. If the child of a working man, in addition to the elements of primary education, receives instruction in the higher branches of arithmetic, plain, and a little solid geometry, free hand and geometrical drawing, and the physical and natural sciences, if he enters the primary school at the age of six or seven years and leaves it at 14 or 15, he is perfectly prepared to go into a workshop or into a manufactory, and is ready to become an excellent workman. Thus primary instruction prolonged and crowned, so to speak, by superior instruction, may be called really industrial.

Mechanics'
Institutes.

Dr. Birkbeck was the first to establish courses of evening lectures for adults, and his first attempts having been received with great favour he passed his life in developing this idea. On this plan there were established everywhere in England Mechanics' Institutes, where it was proposed to organize, on a large scale, scientific education for artizans. These Mechanics' Institutes succeeded very well in Scotland, because there primary instruction is much more disseminated than in England, and the workpeople in consequence were better able to follow and profit by the courses of lectures. In England, on the contrary, where primary education was less developed, the Mechanics' Institutes, after the first success began to decline. They were not altogether closed but they were turned rather into places of amusement than of instruction. More lately, however, now that primary education has been extended by the influence of the school societies the Mechanics' Institutes are again returning to their first destination, and, now-a-days, courses of lectures in theoretical and applied science are given and well attended, lectures intended not to please and amuse but to instruct. Some of these establishments, which have even become the property of artizans themselves, like the one at Manchester, are very large, and contain well-furnished libraries, lecture halls, and class-rooms.

The Government, notwithstanding its habit of holding **Art education**, aloof, could not longer remain indifferent to the force of this movement; it was compelled to interpose, as it had interposed in primary instruction, and to do for the work-people themselves what it had already done for their children. This step was taken when the first Exhibition at London had established the superiority of the art manufactures of France. The English were compelled to acknowledge the necessity of forming the taste of the work-people, the manufacturers, and even of the public; and it was then that they established the magnificent institution at South Kensington, and the system of which it is the centre.

In forming this veritable metropolis of art education, the English seem to have adopted the spirit of French centralization; thus, more than a hundred schools of design established in the centres of industry throughout the kingdom depend to a certain extent on Kensington; teachers trained in the normal school at Kensington are sent to the provincial schools, where they adopt the same system of instruction. From the collections of models, lithographs, engravings, casts, and other objects of art in the South Kensington Museum a travelling collection is formed, which is forwarded successively to all the French establishments in the provinces, and, having made the tour of the country, returns to South Kensington. **Establishment at South Kensington.**

The system by which the teachers are paid is perhaps a little complicated, but up to this time it appears to produce good results. The idea on which it depends is that the teacher should be paid partly by a sum fixed in amount, partly by a sum contingent on the number of pupils he may have, and the success they may obtain in the examinations. Thus the prizes given to the pupils—and they are numerous—become a source of profit to the teachers; every distinction obtained by the pupil brings, in a proportional degree, a pecuniary reward to the teacher. **Grants to teachers.**

But instruction in art-drawing alone does not constitute a complete system of technical instruction; it was soon found necessary to organize also scientific education for the working classes. Since 1859 the department of the Privy Council administering the institutions at South Kensington has adopted the significant title of the “Science and Art Department.” Courses in the principal branches of mathematical and physical science were given at South Kensington; they were established also in the chief provincial towns, chiefly in those where schools of art were in existence. The **Education in science.**

same organization was adopted for instruction in science as already existed for instruction in art; thus artizans cannot only attend regular courses of lectures, but they can also pass examinations and receive diplomas, and these diplomas have a pecuniary value for the science teachers as is the case for the art teachers.

General
character of
modern edu-
cation in
England.

In summing up, M. Marguerin believes that there is in course of being established in England an extensive system of technical education for artizans, maintained to some extent by the private efforts of the artizans themselves, but largely aided by grants from Government. Both that and the education of the middle classes (which is reforming itself) comprises the mathematical and physical sciences, drawing, and modern languages; it is general and theoretical, and yet applied; it addresses itself to the intelligence, not to the hand; it leaves apprenticeship to the workshop, and does not introduce it into the school.

Views of
M. Marguerin
on the course
to be adopted
in developing
technical
education in
France.

In M. Marguerin's opinion the problem of technical education would be in part solved by the establishment, in all parts of France, of Schools organized on the plan of the Turgot school, giving a general and not a special instruction. But in order that these schools may be successful, it is necessary that they should form distinct establishments everywhere, where the necessity for that distinction exists. They must meet the wants of the localities where they are situated, being in one place commercial schools, in another industrial, in a third, agricultural; and they must be organized so as to attract to themselves the lower middle-classes, and the élite of the working classes. Particular care must be taken that they adapt themselves to the social condition of the population around them. The success of the technical school at Mulhouse, proves how great an advantage it is to be on a separate and distinct footing; if this school had been but a division of the College at Mulhouse, it would not have developed itself as it has done. Lyons, Marseilles, St. Etienne, Bordeaux, Nantes, Rouen, Amiens, Lille, &c., are sufficiently important centres for Lycées and technical schools to prosper side by side, and the more so when the two establishments are kept separate and distinct from one another.

Extension of
technical
instruction to
the upper,
primary, and
communal
schools.

M. Marguerin would also recommend that the same kind of instruction should be introduced into such of the upper primary schools (*écoles primaires supérieures*) as are still in existence, and into those communal colleges where classical studies are not so strongly insisted on. Thus an extensive system of technical education would be established in the

country on a most comprehensive plan, and at the least possible expense. In this system, professional instruction would maintain all that flexibility which is indispensable to it without ceasing to be general: it could, according to need, be in one place more commercial, in another more industrial, in a third more agricultural. For it would not be confined within the rigid limits of a uniform plan; though under the inspection of a central authority it would preserve the liberty of action which is necessary to the success and prosperity of every institution.

With regard to the Schools of Application (*Ecoles d'application*) where the technical and the special ought to predominate, such as the weaving school (*Ecole de Tissage*) at Mulhouse, the school for the manufacture of clocks and watches (*Ecole d'Horlogerie*), at Besançon; it is very easy to understand their utility. It is an excellent plan to establish such schools in localities where they would meet the wants of great industries demanding them. If the existing schools of Arts and Trades (*Ecoles des Arts et Métiers*), at Châlons, at Angers, and Aix, do not yield every year a sufficient number of workmen and mechanical draughtsmen, new schools of the same description should be established. If the agricultural schools of Grignon, Grand-Jouan, and La Saulsaie, and the farming schools (*Fermes Ecoles*), are not large enough to admit all the applicants, of course it would be necessary to multiply such establishments; the demand proves and necessitates the supply. And still what is being done in the Turgot School, would be done in other establishments of the same description, for they would find in the Schools of Application, a natural outlet for their scholars, and the latter would be recruited from a body of children perfectly prepared for practical apprenticeship.

In summing up what he has to say upon the subject, M. Marguerin repeats his objections to the introduction of manual labour into schools. In the first place, he believes that the expense of providing teachers and tools for instruction in so many branches of trade and manufacture would form a serious consideration; secondly, that the schools are not likely to reap any profit from the sale of the manufactured article, as it can scarcely be supposed that in this they can compete with well trained and skilled artisans; and, lastly, he believes that the dangers and abuses of apprenticeship in the workshop have been exaggerated.

But though he doubts the advantages of the introduction of manual labour into schools, he fully realizes the benefits of attaching schools to the workshop. A communal school,

Schools of Application.

Objections to the introduction of practical handicrafts into technical schools.

Technical schools attached to manufactories.

School at
Creusot
Works.

which is at the same time an industrial one, has been established by the proprietors of the great works at Creusot for the benefit of their workpeople and their children; it numbers now no less than 900 scholars. In the upper classes are taught arithmetic, geometry, the elements of algebra, trigonometry, and mechanics, together with physics, chemistry, and geometrical drawing. At the age of 14 or 15 years the pupils leave the school to be employed in the works, and they are distributed according to their capabilities among the drawing rooms, the fitting shops, and the offices. After they have entered the factory they can also attend the evening classes, where they complete the education which they received at school. The foresight and liberality of large manufacturers have produced similar institutions in other parts of the country, and France is better provided with such schools than is generally supposed. They are, however, not so common there as they are in England, where there is a more widespread feeling of individual responsibility.

M. Marguerin thinks that every effort should be made to multiply day schools for children, and evening classes for adults, attached to large works and manufactories, in which the elements of applied science should be added to the ordinary course of primary instruction. The State could well take the initiative by attaching such institutions to the government works, as models of applied technical instruction. The boards of directors of the different railway companies, who employ so many engineers, could equally well organize schools adapted to the wants of their large staffs.

Evening
classes for
adults.

Where no large works or manufactories exist the evening classes for the instruction of artisans in applied science might well be established, and it is to be regretted that the attempts hitherto made in this direction have not met with the success which they deserve. The Polytechnic Society and the Philotechnic Society have given—the former since 1830, the latter since 1848—gratuitous courses of evening lectures on applied science, and both have received pecuniary assistance from the city of Paris, as well as from the Minister of Public Instruction. The Polytechnic has four institutions where such lectures are given, the Philotechnic three, but of all the courses only those which are installed in the Central School and at the Turgot School are in a flourishing condition, because there they enjoy the use of the large lecture theatres of those institutions as well as of the necessary physical, mechanical, and chemical apparatus. These two societies, moreover, have instituted similar courses in the

neighbourhood of Paris, at Vincennes, at Ivry, Sceaux, St. Denis, and Corbeil.

To these lectures in applied science instituted by these two societies must be added the courses of drawing applied to the technical instruction of the artisan. Such courses have been established at the free schools, aided by the city of Paris, and others, are given at a certain number of commercial schools, both lay and ecclesiastical, at the expense or with the assistance of the city. Of the six free schools, three have produced remarkable works, which were appreciated at the London Exhibition, and more recently at the Exhibition of Industrial Arts (*Exposition des Arts Industriels*), but the 44 courses at the commercial schools are far from producing satisfactory results. The city of Paris is now preparing a reorganization of these schools of design, and it is to be hoped that the liberal initiative taken by the metropolitan may be followed by the provincial cities. The English attempt to arrive at a complete instruction in drawing by a system which centralizes the schools of design throughout the country in the museum and schools at South Kensington, and by means of these schools of design to influence the style of their designers, the methods of their manufacturers, and even the public taste. It is not to be supposed that the French will be required to make so great an effort, but it may be hazardous to rely too much upon their superiority.

Courses of instruction in drawing.

Schools of design in England.

In addition to those already mentioned there are in Paris also other gratuitous courses of instruction maintained from the resources of the city; these are given also in the evening, and are held in the halls of the communal schools. They are numerous, well conducted, and well attended. But they are intended rather to give the elements of primary instruction to the numerous artisans who are drafted to Paris from the provinces, where they have either not been at school at all or have remained at school too short a time to do more than obtain the mere elements of applied science. These, therefore, can scarcely be considered as rendering any assistance to technical education.

Free lectures in Paris.

In concluding this portion of the subject M. Marguerin makes some remarks upon the condition of primary education, the insufficiency of which he considers to be the great obstacle to the extension of technical instruction. The children at the primary schools usually leave school when 12 or 13 years old, at which age it is impossible that they can have received enough elementary instruction to pre-

Extension of primary necessary to the development of technical education.

pare them for the scientific branches of education. M. Marguerin therefore is of opinion that the children should be kept at school a year or two more, during which they should undergo a more extended course of arithmetic and drawing, both ornamental and geometrical, and should receive instruction in the physical and natural sciences. In the agricultural districts the schools might be supplemented by adult evening classes during the winter and Sunday schools during the summer.

Evidence of the Rev. Father Baudime, Assistant Superior of the Christian Brothers' School.

Industrial instruction in the Christian Brothers' schools.

The Christian Brothers' schools date from the year 1709, when the first Sunday school was established in the parish of Saint Sulpice with 200 pupils. The order was re-organized by Imperial decree in the year 1808, and in the year 1815 Father Philip, who is now the Superior General, established in the school of Auray (Morbihan) a course of lectures to prepare young men for the dockyards and for the coasting trade (*cabotage*); into this he introduced the elements of geometry and other sciences connected with their professions, and he himself composed some textbooks to facilitate the studies. In the year 1830, at the instance of the Government, which was occupied with the amelioration of the condition of the working classes, schools for adults were opened by the Christian Brothers in Paris. At first the instruction was confined to reading and writing, but afterwards the rudiments of drawing were added. At this time Father Philip composed a short treatise on practical geometry applied to mechanical drawing, which contained also a summary of architectural drawing, levelling, and perspective. It was soon found that a great number of the Paris workmen engaged in the manufacture of fancy articles (*articles de Paris*) required a knowledge of ornament, and accordingly a course of free-hand drawing and of drawing from the figure was introduced. Father Baudime himself was appointed director of the drawing school in the Marché St. Martin, and here he established a collection of mechanical models by Leblanc, and adopted as textbooks the Treatise on Cabinetwork by Coulon, on Carpentry by Leroy, on Locksmiths' work by Petit, on Upholstery by Janselme, and on Stonework by Simonin. To satisfy the demands of some of the pupils, who desired to execute work after their own designs, a workshop on a small scale was erected in the school, where two evenings in the week skilled workmen,

Drawing applied to the arts at the school of the Marché St. Martin.

Workshop established in connexion with the same school.

who were themselves pupils, could give their comrades instruction in the practical branches of their trades. These attempts remain on the same modest scale to the present day, and evening classes on the same plan have been established at a dozen communal schools in different parts of Paris. Everywhere, however, the same difficulty presents itself—the class rooms being occupied all day by the children of the primary school it is very troublesome to arrange the furniture necessary for teaching drawing to adults in the evening.

The classes are divided into two divisions, one open from six to eight o'clock in the evening for apprentices from 13 to 16 years old, the other from eight to ten for workmen of 16 and above. Every year the works of the pupils are exhibited in one of the amphitheatres of the Conservatory of Arts and Trades; each work bears the name of the pupil, his age, the time of his apprenticeship, and the name and address of his master. A board, composed of manufacturers of good position, awards and distributes the prizes.

System of teaching at the evening classes.

In different quarters of Paris local committees, composed of manufacturers and persons of good position, have been formed to visit the different schools weekly, and to bring masters and apprentices into communication.

Local committees.

When a master receives a pupil of one of the Christian Brothers' schools as an apprentice, care is taken that the indentures are properly executed and signed by the president of the local committee, the master, and the father or guardian of the apprentice; thus in case of disagreement the local committee has the power to interfere. Every month a member of the order visits the different workshops where apprentices have been placed to inquire into their conduct and industry. The notes thus collected, together with those made by the Brothers on the attendance and work of each pupil at the evening school, are taken into consideration when the prizes are awarded at the annual distribution.

Apprenticing a pupil from the Christian Brothers' School.

At the time of the revolution of 1848 several of the schools of the Christian Brothers were abandoned, and many others have been with difficulty maintained; they are still, however, able to obtain situations as apprentices for many children, and the annual exhibition continues to be held, though on a smaller scale.

The lessons given at these schools are entirely gratuitous, and the masters are paid by the municipality of the city at the rate of 10 francs per annum for each pupil. There are altogether about 20,000 children of from 6 to 14 years old in the Paris schools, and 4,000 to 5,000 adults, workmen,

Primary aid from the City of Paris.

or apprentices. The latter have to furnish themselves with the books necessary at the school, and the city provides those which are given as prizes.

Success of the
Christian
Brothers'
schools.

The success of the schools with their junior pupils is considerable, and most of the scholarships for the Chaptal and Turgot Colleges, which are filled up at an annual competitive examination, are taken by them ; but perhaps the most remarkable feature is the evening classes for adults. At the school in the Marché St. Martin alone between 800 and 900 such pupils attend the classes, some of whom are men of 25, 30, 35, or even 40 years of age ; but the number in attendance is fluctuating, as from the peculiar nature of his employment the manufacturer of fancy articles has the evenings of the summer months only at his disposal, while on the other hand, a journeyman in one of the building trades is more at leisure during the winter months. The adult schools are divided into four classes, in which the pupils are classed according to their proficiency in the elements of reading, writing, and arithmetic.

Instruction in
drawing.

The following is the method of instruction adopted for teaching drawing:—At the commencement of the course the first half-hour of the lesson is employed in a lecture on geometrical drawing ; this is then reproduced by some of the pupils on the black board, while the remainder copy it into their books. During the second part of the lesson the pupils draw from copies graduated according to the ability of each. Afterwards comes drawing from natural objects ; the pupils make a sketch of an object, then take the dimensions, and produce a finished drawing of it to scale. The number of copies in the schools for such purposes is small, but, up to a certain point, sufficient for the wants of the pupils. Sometimes, when the time of the pupils is less occupied, they are taken to visit a large manufacturing establishment ; here they take rough sketches of the different tools, or of portions of the machinery in use. As regards copies for ornamental drawing the schools possess only such as can be bought in the shops, though a few designs of foliage, &c., have been expressly made by some of the Brothers.

Educational
works pub-
lished by the
Christian
Brothers.

The works published by the Brothers, and in use in the schools, are,—

1. Geometry, by Father Philip ; published in 1831.
2. A revised edition of the same ; in 1858.
3. A course of ornamental design, by Father Arcadius ; published in 1845.
4. A similar course, by Father Mance ; in 1846.
5. *Vignole*, by Father Fructule ; in 1847.

6. Course of practical geometry, by Father Rossore ; in 1850.
7. Course of outline drawing, by Father Arcadius ; in 1854.
8. Copies of outline and tinted drawings, by the same author, now in the press.

All these works not being of a sufficiently elementary character for junior schools, a series of drawing copy-books was published in 1860, adapted to popularize the drawing of ornament in all schools, from the village school to the middle-class school of large towns. In the method adopted in giving this elementary instruction in the drawing of ornament care is taken to select copies on good grounds only, that is to say, either on the score of taste or style ; every study, every fragment has a name attached to it, giving the character of the style to which it belongs. Thus, after going through the course of copy-books the pupil can easily distinguish between Grecian, Roman, Byzantine, Gothic, Renaissance, &c. orders of ornamentation, and is even sufficiently advanced to make an original design belonging to one of those orders.

Drawing from the cast and modelling naturally follows on that of ornament, but the little time which the junior pupils can devote to the subject permits this branch to be carried on only in the adult evening classes. To ornamental drawing ought to be added geometrical drawing, being of much more importance to the working classes. The method adopted in teaching this subject consists in hanging up before the class a large sheet, four feet by three, containing copies of joiner's work, upholstery, carpentry, architecture, and machines ; the pupils have by them figured sketches of these copies so as to be able to reproduce on their books these copies to any required scale. By this means a class of from 50 to 60, and even a 100 pupils can work at the same subject, and follow the explanations of the teacher. To facilitate still more the study of this subject, and in order that the pupils may have a better knowledge of what objects they reproduce, they have set before them solid models of the same objects as are on the large sheets, some in wood, others in plaster or cast metal ; the models are cut by vertical or horizontal planes, so that the details for the drawing are better understood. To these models others are added to be handled by the pupils themselves that they may make sketches of them, with different elevations and plans. By this means it has been found possible to make children of from 10 to 13 years understand the theory of projections.

Drawing from the cast, modelling, and geometrical drawing.

Christian
Brothers'
schools out of
Paris.

Other adult schools, conducted on the same plan as those at Paris, have been established at Nancy, Cambrai, St. Omer, Orléans, Rouen, Lille, Clermont, and several other towns of France; but there is one at Volvic (Puy-de-Dôme) which is particularly worthy of notice. This school has been specially adapted to the locality where it is situated, which is known as furnishing a peculiar building stone. The Brothers had had a small primary school there for some time without producing any noticeable results, until they attached to it a workshop for cutting and sculpturing stone, and induced a couple of skilled workmen in this branch of trade to undertake the instruction of about 20 pupils. Already many works of merit have been completed at this establishment, and have not only been admitted to exhibitions, but have been also employed in the construction of large edifices. Another example of what may be done in schools for furthering the industrial interests of a locality are the boarding schools of the Christian Brothers at Lyons and St. Etienne, the centres of the silk and ribbon weaving trades. To these schools are attached special classes, where the children are taught not only to design but to read and pierce the design on the cards of the Jacquard loom, as well as to work the loom themselves. Each of the schools at Lyons and St. Etienne was furnished with looms, and thus young people leaving the schools were not only instructed in theory but had also often sufficient practical knowledge to take the position of foremen. In the revolutionary year of 1848, however, the insurgents, dreading the competition of these schools, broke into them and set fire to the looms, and since then the Brothers have not repeated the attempt at special instruction.

Workshops
attached to the
school in the
Rue Neuve,
St. Etienne du
Mont.

The ateliers connected with the establishment of the Brothers in the Rue Neuve, St. Etienne-du-Mont, at Paris, is another instance of the manner in which they have fostered the training of their scholars in different handicrafts; unfortunately as at Lyons and St. Etienne they were compelled to close the institution during the revolution of 1848, and have not since re-opened it. In this establishment the Brothers had the care of the elementary education, the boarding and clothing of the pupils, but the ateliers were under the control of a local committee of manufacturers, who entered into contracts for the execution of work entrusted to them, supplied the material, and furnished skilled workmen as teachers. Such of the pupils as wished to learn a handicraft were regularly bound apprentices to this committee.

School of St.
Nicolas.

The school of St. Nicolas is managed on a similar plan to the one just mentioned. In this boarding school there

are 1,500 children, of whom about 100 attend the workshops. Two hours every morning are devoted to the education of the apprentices; that is to say, for three days in the week in elementary instruction, higher branches of arithmetic, and the mensuration of surfaces and solids; the three other days in instruction in drawing. Space for all is at present wanting, but it is hoped in time to provide workshops for the following trades—

Woodcarvers.	Gold chain makers.
Bookbinders.	Leather trunk makers.
Metal chasers.	Bronze mounters.
Makers of brass musical instruments.	Shawl pattern designers.
Turners of optical instruments.	Gilders on wood.
	Packing case makers.
	Bootmakers.

The workshops are under the directions of private teachers, who come in the morning and leave at night. Each pupil pays monthly 30 francs, for which sum he is boarded and clothed. In order to prevent loss to the contractor from the inferior quality of the work produced at the workshops by young hands, the teacher is permitted to introduce skilled workmen, who must produce satisfactory evidences of their capability, partly to ensure a more excellent workmanship in the work delivered, partly to assist in the instruction of the pupils in manual labour. Those of the pupils of the institution of St. Nicolas who do not elect to enter the workshops leave the school at the age of 14 years. The Brothers are, however, permitted to keep a number, not exceeding 60, until their 16th year, the two extra years being devoted to instruction in book-keeping, accounts, and other subjects useful in commercial pursuits.

The mass of the children who are taught at the St. Nicolas institution belong to the working classes; they are the sons of small tradesmen, or of journeymen; in every case of parents who find it difficult to earn a livelihood. It is impossible for people in this station of life, after paying for the education of their children, to pay in addition for their indentures as apprentices, and thus, unless they enter the workshops of the school, they are compelled to find employment in small private workshops, when they are exposed to every kind of moral temptation.

The horticultural schools of Issy (for 20 children) and Igny (for 60 children), in the neighbourhood of Paris, were established by the Christian Brothers to counteract the tendency of the population of the rural districts to gravitate to the large towns—thus producing a scarcity of hands for agricul-
Horticultural schools.

tural labour,—by giving rise to a counter-current, and by creating a desire for horticultural pursuits to attract the suburban population to the country districts. Though they have not succeeded in this object, they have been enabled to turn out a number of intelligent young men, able at once to undertake under-gardener's situations in the large villa residences and in the nursery grounds in the neighbourhood of Paris. A third establishment of the same kind exists at Clermont-Ferrand (Puy-de-Dôme), which has obtained a high reputation in the locality where it is situated; the demand for young gardeners trained at this institution is greater than the supply. The course of instruction includes the principles of drawing and geometry applied to laying out gardens. At all such establishments it is found to be a drawback that the pupils are withdrawn from school at too young an age, before they have completed their course of studies, in order that their parents may realize the profits of their labour.

Agricultural
school at
Beauvais.

The agricultural school at Beauvais, also under the care of the Christian Brothers, is intended for pupils of a higher social position. Here they are trained to become teachers of agriculture in other establishments, or they are the sons of landed proprietors, and attend the school to study the science both theoretically and practically, and to fit themselves for managing and farming their own estates. Of the first class, many have already found situations as professors, and the others carry back into their own districts a knowledge of new agricultural implements, and of the best methods of cultivating the soil. It is hoped that they will succeed in eradicating the prejudices against the modern system of farming which are so common among the rural populations.

Opinion of
Father Bau-
dime on the
means of
developing
technical
education.

In giving his opinion of what should be done to extend technical education in France, M. Baudime recommends that drawing should be taught in all rural and elementary schools, with the double object of enabling the children to make a correct sketch with facility, and of improving and developing their taste. In the large towns schools of art should be established for the use both of apprentices and adults, in which the instruction given should have special reference to the industry of which any particular town is the centre. For youths employed in factories evening classes in drawing should be formed, and the employers should be induced to give special facilities to their apprentices to attend such classes, and there to complete the elementary education they have received at the primary schools by instruction applied to the trade which they pursue. If the locality possesses a

good free school, in which attempts have already been made at industrial training, the State could by judicious assistance sustain and improve these attempts; if, on the contrary, no such institution exists, it would be more convenient to establish classes for technical instruction in connexion with the public communal school of the district, giving the teacher the means of satisfying the wants of the locality with a liberality which should prove to him that his zeal and devotion are appreciated. In either case it would be well to form a local committee of manufacturers to direct and watch over the classes—men to whom the success of the school would be an object.

As regards the introduction of manual labour into schools, M. Baudime considers it desirable to adopt the plan which is in use at the St. Nicolas Institution; schools on this system, established in the great centres of industry, could produce a constant supply of skilled workmen. It would be necessary to guard against any appearance of competing with local manufacturers, and this, as at St. Nicolas, might be avoided by inducing a manufacturer to take an apprentice-workshop on his own account, quite independent of the school, except as far as regards the supervision of the conduct and training of the apprentices.

Manual labour
in schools.

Evidence of M. Pompée, Founder and Proprietor of the Professional School at Ivry, formerly Director of the Turgot School, and Member of the Municipal Committee of Paris on Higher Primary Education, Vice-President of the Polytechnic Society.

The Ivry School follows the same system, and adopts the same subjects of instruction as the Turgot School, of which M. Marguerin has given a description; but it is strictly a private boarding school, and attended by children of a higher social position, and whose parents are in more easy circumstances than those who go the Turgot School. The terms of the school are 854 francs annually, including all scholastic necessities except washing, and M. Pompée has never received any pecuniary aid in establishing or maintaining his school. The course of instruction given during each year of attendance is distinct and separate, so that if circumstances compel a pupil to leave school before the completion of his studies, he is in a position at once to apply the knowledge he has acquired. Latin and Greek are excluded from the programme, but great attention is paid to the study of the French language and literature, foreign languages, and history. It is not thought necessary to introduce manual

System of
instruction at
the Ivry
School.

labour. The method of instruction consists principally in cultivating the intelligence of the pupils, in making them acquainted with substances used in the arts, by means of numerous collections of every kind ; in giving them an insight into chemical manipulations and technical processes, by frequent visits to public and private manufacturing establishments. There are now (1863) 95 pupils, all boarders, divided into four divisions, including a small number in the preparatory class; they are mostly children of professional men, and some are placed at the school after having commenced a classical education, which they were found incapable of pursuing. They can only be admitted to the professional studies after having received a good primary instruction, which brings the age of entering the course to 12 or 13 years, and that of leaving to 15 or 16 years, as it extends over three years. Those pupils who present themselves for admission to the school after giving up their classical studies are generally older, and then often they possess an amount of elementary knowledge inferior to that of the children at good primary schools.

The expenses of creating this establishment have been considerable; M. Pompée has had to rent four hectares (about two acres and a half) of land, and to sink much money in conversions and fittings, in the construction of laboratories and class rooms for drawing, in the purchase of collections of natural and manufactured products, of physical and mechanical apparatus, casts, and models. There is a numerous staff, consisting of four in-door masters for the supervision of morals and the maintenance of discipline, and 10 daily masters, each of whom teaches only a special subject; the salary of the latter depends on the disbursement each has to make in coming to the school, and the length of time he is employed. Notwithstanding all these expenses, the number of pupils has always been sufficient to render the undertaking a remunerative one.

Success of the
school.

M. Pompée finds the results of the instruction and the success of his pupils to be most satisfactory. The methods adopted are of a character to keep the attention always on the stretch, and boys whom want of success in their classical studies has rendered dull, apathetic, and idle have recovered at the Ivry school all their activity of mind; their reasoning powers are awakened, they take an interest in their work, masters have not to punish, nor parents to complain. The employers under whom they find situations on leaving school are the first to discover the great difference between pupils trained on this plan and those who have received a classical education.

On the whole, M. Pompée thinks that the tendency to attend special rather than general instruction is rapidly increasing in France, notwithstanding its present incomplete organization. Even in the university the inspectors-general have had occasion to remark the constant augmentation in the number of those who attend the special classes; in 64 out of the 74 Lycées, and in nearly all the Communal Colleges, special instruction has been instituted, and is attended by one-sixth of the whole number of scholars—3,312, according to the last reports. A similar result has been established in Belgium. In that country the system of instruction given at the Athénées, which correspond to the French Lycées, was, up to the year 1850, exclusively classical. When this was modified by the law of the 1st of June of that year, there were in all 2,441 scholars attending these schools. The modification introduced by the 21st article of the law consisted in establishing in each Athénée two parallel courses of studies, the one classical, the other commercial, it being left to the parents to decide which course their children should adopt. At first the separation took place in about equal numbers, as (excluding the Athénée of Brussels, for which there is no return) on the 1st October 1851 the numbers at the nine other Athénées were, 1,105 scholars in the commercial and 1,190 in the classical division. After this date the progressive condition of the two courses of study may be seen in the following table:—

Years.	Numbers attending the Athénées.	Divisions.			Difference.
		Preparatory.	Commercial.	Classical.	
1852	2,516	98	1,234	1,184	50
1853	2,476	85	1,224	1,167	57
1854	2,530	71	1,339	1,120	219
1855	2,561	514	1,167	880	287
1856	2,494	512	1,196	786	410
1857	2,602	517	1,279	806	473
1858	2,847	621	1,376	850	526
1859	2,891	617	1,389	885	504
1860	2,939	636	1,417	886	531

Comparing these numbers, we see that in the period of nine years, notwithstanding the annual increase in the number of scholars (2nd column), and not taking into account the figure in the preparatory division (3rd column), where no separation between classical and commercial takes place, 1st, that the number in the commercial division (4th column) has increased every year; 2nd, that the number in

the classical division (5th column) has decreased every year ; 3rd, that the difference in number between the two divisions (6th column) has always been in favour of the commercial.

The inferior course of commercial education established by law in what is called the Middle Schools (*Ecoles Moyennes*) extends at most over two or three years ; it is, therefore, less complete and less extensive than in the *Athénées*. The number of scholars attending the 49 Government middle schools was, on the 10th November 1860, 6,962, of whom 4,461 were in the preparatory divisions.

Natural history
in the Belgium
schools.

The course of studies adopted at all these establishments is in general perfectly in accordance with the views of M. Pompée ; he finds only that the instruction in natural history is too scientific, and not sufficiently developed. The master could take the opportunity, in teaching this subject, of inculcating a knowledge of raw materials, which is of the highest importance to those who are being trained for agricultural, industrial, or mercantile pursuits. He is able at the same time to introduce technological instruction by giving an account of the different processes by which natural are converted into manufactured products suited to the wants of man.

Separation of
courses of
study in the
French Lycées.

M. Pompée believed that the system of division of the course of studies adopted in the Belgian *Athénées* could also be applied to the Lycées in France, provided that the two divisions be kept perfectly parallel. They must be placed on a footing of absolute equality, so that parents may be able, without hesitation, to entrust a child to that division appropriate to his future career in life ; that if requisite, of two brothers, one may attend the commercial, the other the classical division, without perceiving on either side any inferiority.

Plan of
M. Pompée for
re-organizing
professional
education in
France.

In reply to the question as to what should be done to organize in France a complete system of professional education, M. Pompée advocates changes of rather a sweeping character. He likens his plan to a railway system, with its main-line stations, junctions, and branch lines. First, taking all the courses of study at present pursued at the primary schools, the technical schools, the communal colleges, and the lycées, he would from them construct one general course, to extend over nine years, and to be pursued by all alike, rich or poor, upper, middle, or lower class, sitting side by side on the same benches ; this would form the main line of his system ; but it would be impossible for all to reach the advanced years of the course ; just as passengers on a railway get out at the different stations, so the children who, from

pecuniary necessity or social position, are compelled to earn their livelihood at an earlier age, might leave school at any point of this course, subject to certain conditions. Along the main line he would place his branch lines, the special schools, which would take at particular periods from the general course those children who have to adopt a distinct career in life; thus, all the passengers would be admitted indiscriminately to the same train, they can book themselves for any destination, they can be carried to the end of the journey or be set down at any station they may please. If they have been put down at any station and have changed their mind as to their destination, they can continue on the same road, or rejoin the nearest branch without being obliged to retrace their steps. In other words, if such a general and uniform course of study were adopted we should see at the end of every scholastic year pupils, more or less advanced, leaving the various classes, all, according to the amount of knowledge they have acquired, able to take their proper place in the different strata of social stratification, some entering at once the factory, the counting house, or the workshop, others to undergo their apprenticeship in the agricultural, commercial, industrial, or art schools which are ready to receive them.

As regards the principal course, the subjects of instruction would be arranged progressively for each succeeding year of the nine years over which it would extend, but they would be taught in a different order and on different methods to those now adopted. Thus M. Pompée would postpone the commencement of the study of the ancient languages (of use only to the minority) until the pupil has reached an advanced class, when by reason of the knowledge he has already acquired and by the development of his faculties he could in four years complete with pleasure and interest the classical studies which now occupy the whole of his time, and leave behind them often nothing but the recollection of fatigue and annoyance. At this time—that is to say, when the pupil is 13 or 14 years of age—the others who had not determined to study Latin or Greek will either have left school altogether or have been drafted into the institutions for special instruction. By this means all will have received a thoroughly sound elementary and general education, forming a foundation for the superstructure of an extended professional or technical training.

The main system of general education must be supported by the State. If the public authorities were not to interpose, in the absence of the habit of taking the initiative and

Principal
course of
general educa-
tion.

Intervention of
the State.

of the spirit of co-operation, which are as scarce in France as they are developed in England, general education would fall into the hands of the religious bodies, an end not by any means desirable. On the other hand, special and professional education must be directed and fostered by the communes, the chambers of commerce, and the industrial societies, always with some assistance from the State. Not that the educational system is to be deprived of freedom of action, that is an element indispensable to every beginning, to all progress, to every completion; to the private efforts of individuals, either singly or associated, are due all the institutions which are now at work supported by the State. Free institutions and societies are the pioneers who clear the soil and experimentalize at their own risk; if they succeed society approves of their labour, and the State encourages and adopts them; if not the establishments are carried on with difficulty after the death of their founders. At the same time, while claiming this liberty of action for popular education, M. Pompée does not rely on it altogether any more than he would rely on volunteers to recruit the army.

Education of
apprentices
below 12 years
of age.

Of children who are to pursue handicraft trades M. Pompée believes that there already exist the means for instruction, but they must be fully developed. With regard to apprentices of from eight to 12 years engaged in factories and workshops using power, or even in workshops employing more than 20 hands, the law of March 1841 decrees in Article 5, "No child of less than 12 years may be admitted to work unless his parents or guardians can prove that he actually attends some private or public school established in the vicinity." Every child at work must until he is 12 years old go to school. In this case school and manual labour co-exist, but in separate localities. Unfortunately this regulation does not extend to children employed in small workshops or in factories not coming under the law concerning the labour of children. For children who have received the elements of general or primary instruction, which assumes an age of 12 years, the most simple and profitable training in a handicraft is the workshop and the personal supervision of the employer or his deputy. In this case industrial manufacture forms and will continue to form its own workmen. Here there is nothing to create; it will be sufficient to protect the children against the rapacity of speculators, to prevent their powers being tasked beyond their health and strength; in fact to enforce the 8th and 9th articles of the law of the 22nd February 1852 on the duties of masters towards their apprentices.

The 10th article of the same law lays down that “if the apprentice of between 12 and 16 years cannot read, write, and cypher, or has not finished his first religious instruction, the employer is bound out of the day’s work to allow him time and liberty to obtain this teaching.” But the question remains, Where shall he go to find it? It is true in Paris and some other populous towns night schools have been opened to satisfy this want; but in the majority of places no such institutions exist. M. Pompée recommends the establishment of Improvement Schools (*Ecoles de Persévérance*) for the use of apprentices who would otherwise lose the elementary knowledge they may have acquired. It would be impossible to make primary education in France compulsory under pain of fine or imprisonment; but it seems strange that a similar plan to that which is adopted for the pupils of the colleges and the lycées should not be adopted for those who can receive only elementary education. In the former secondary instruction is so far compulsory that none can be admitted to the special schools, to the public offices, nor to certain appointments unless they can produce satisfactory evidence of their having received a certain amount of secondary education.

Apprentices
between 12
and 16 years
of age.

For the education of the apprentice or journeyman above 16 years of age the law makes no provision, but those who are entirely ignorant can attend the adult schools, though these are still too few in number. Or, if they wish to obtain various kinds of special to complete their elementary education, why not imitate and augment the number of the courses continued for 34 years by the Polytechnic Society? Thus for all degrees the school would run parallel to the workshop, and workmen, whether youths or adults, would find at the side of the technical instruction of the trade they have chosen an intellectual and moral training adapted to the wants and capacities of each.

Adult schools.

Of course both geometrical and art drawing would form part of any system of general education, but it would also be necessary to establish special courses of drawing for the apprentices or workmen whose trades require accuracy and nicety of taste and feeling.

The above are the measures which M. Pompée recommends to improve and extend the special education of the working classes,—for those who have only had time or means to master the elements of primary instruction; he goes on to speak of what should be done for those who have received a general professional instruction, and who are to embrace trades or professions requiring more special

Special training
of the class
above the
artizans.

knowledge, who are to become in fact what may be called the petty officers of industry and commerce. For those who make agriculture their profession special agricultural schools already exist, and if their number is insufficient why not fall back on the provisions of the decree of the 3rd of October 1848? The commercial schools provide appropriate technical teaching for those who embrace a mercantile career. For artists there are the Fine Arts School (*Ecole des Beaux Arts*) and the Academy of Music (*Conservatoire de Musique*). It will be more difficult to provide special instruction for those who enter the manufacturing trades, because it is impossible to create one uniform system of technical training for industry as has already been done for agriculture, commerce, and the fine arts. Where, however, a particular class of manufacture has concentrated itself in a locality special industrial schools may be well established. This has already been the case for the construction of machines (at Châlons, Angers, and Aix); for clock and watch making (at Besançon); for the manufacture of woven fabrics (at Mulhouse, Amiens, Lyon, Rouen, and Lille); for metallic, chemical, and ceramic manufactures, &c., &c. For students of a still higher social position there have been established the Polytechnic School, the special schools of bridges and roads and of mines, the military and marine engineering schools, all excellent in their way and admirably serving the purpose for which they are intended.

The attempts which have been already made and the results obtained ought to be sufficient to enable us to solve the question, Whether an apprenticeship to manufactures in the special school is preferable to one in the workshop, the factory, or the laboratory. Whatever may be the solution of this important problem, there will always be a considerable number of youths who on leaving the general secondary schools will at once enter the employment of farmers, merchants, bankers, builders, chemical manufacturers, architects, &c., &c., where the services they can render will be eagerly welcomed, and where the information they have acquired will enable them rapidly to make their way.

Manual labour
in schools.

M. Pompée does not approve of the introduction of manual labour into primary schools. An experience of 28 years enables him to state with confidence that the time children are at school, that is to say, from their seventh to their twelfth year, is not sufficient in many cases to allow of their learning properly reading, writing, and arithmetic. The last

year, which might be occupied with the elements of geography and the history of their own country, is generally devoted to preparation for confirmation. It is only a very few who bring away from school the rudiments of drawing. For instruction in manual labour *time* is wanting; it is impossible to select from the subjects now taught any one which could be sacrificed to it. If indeed time could be found without injuring the training in elementary schools, what kind of manual labour should be chosen? Should it be the plane, the file, the chisel, or the shuttle? And where would be room for the bench, the lathe, the anvil, or the loom? Where can be found a master capable of teaching the use of these tools, and of many others? It is true in case of necessity the use of the spade and the rake might be introduced into rural schools, but at that age it could serve rather as an athletic exercise than as a profitable training. It would be far better to devote the time to the acquirement of the elements of natural science, chemistry, or mechanics, which as agriculturists, the children could apply in after life. Of course the use of the needle should not be neglected in girls' schools, because whatever their position, all women should become sempstresses for their own families. Another strong objection to the introduction of manual labour into schools would be its great cost; the necessary enlargement of the school, the tools and machines (to be renewed with every improvement), the raw material (for which when unskilfully manufactured there would be no sale) would be sources of enormous expense. In one word, M. Pompée sums up, manual labour out of the workshop is nothing but a pastime.

Evidence of M. Delahaye, Director of the Professional School at Batignolles, Member of the Council of Headmasters of the Department of the Seine.

The pupils who attend the professional school at Batignolles are of three distinct social grades. First there are the children of rich or at least well-to-do parents; these pass through the usual course of classical study with the view of qualifying for a university degree. Then there are the children of parents in scanty circumstances, whom an illness or an accident may reduce to poverty; these receive merely primary instruction, and are destined to become apprentices to handicraft trades, errand boys, &c. Between these two there is a third class, which forms the majority of the pupils at this school. These children remain at the school until they are 15, 16, or even 17 years old, according as their

Social position
of the pupils
who attend the
school at
Batignolles.

parents can afford the time and money. The best of them go up to the Schools of Arts and Trades (*Ecoles des Arts et Métiers*) of which the examinations form at once the aim of the pupils at the Batignolles school, and the standard up to which the studies of that school are raised and maintained.

Statistics of
the school.

The school contains 206 boarders, who pay each 550 francs up to 10 years old, and 650 francs above that age, and 130 day pupils, who pay 10, 12, and 15 francs per month. Notwithstanding that it is situated in close proximity to the Chaptal College and at a short distance from the Lycée Bonaparte, this school (founded 17 years ago, and since enlarged) is for the last six years always full, and that without publicity of any sort.

Plan of studies.

The following is the plan of the studies:—From the age of seven to that of 11 or 12 years the pupils receive primary instruction; above that age they pass through four classes, called the commercial and industrial classes, in which the lessons are graduated according to the ability of the pupils, and which keep them until they are 16 years old. This is about on the level of the preparatory course at the Schools of Arts and Trades; but pupils who do not proceed to these schools must also learn history and geography, the elements of literature, of physics, and of chemistry, natural history, technology, and accounts.

Manual labour
in the
Batignolles
School.

Manual labour (but only working in iron) is introduced into the school, but it is confined to pupils who are to pass into the schools of Châlons and Angers; for their use a workshop has been fitted up and furnished with every necessary. The hour fixed for instruction in this subject is seven o'clock in the evening, when the school work of the day is over, so that if the labour fatigues the pupils they can at once retire to rest. Formerly the boys used to frequent the workshops of manufacturers in the vicinity of the Western Railway Company (*Chemin de Fer de l'Ouest*), where they were gladly accommodated; but it was found that they returned to school weary and tired, and too sleepy to pursue their studies in the evening; their morals also suffered by being brought into contact with the workmen. For the other pupils the parents themselves do not desire instruction in manual labour; on the contrary, they are anxious to see their children elevated above the level of mere handicraftsmen. M. Delahaye himself felt at first a great repugnance to the introduction of manual labour into the schoolwork, fearing it would have an injurious effect on the habits and industry of the pupils and on their love for their studies; he only consented to it on condition that it should be confined to those who were to enter the Schools of Arts and Trades.

Great importance is attached to the teaching of drawing, so much so that the boys of seven years old commence to learn drawing at the same time that they begin to learn to write. A peculiar method is adopted in this subject, which might with advantage be adopted in the primary schools. Paper ruled in squares is used, so that by the aid merely of the ruler and pen a child can make many different drawings, which, it must be confessed, are not very artistic, but which accustom him to neatness, give him a notion of symmetry, and educate his taste. When these children come afterwards to the use of the compass and bow-pen, and to tint their drawings, their hand is practised, and often very skilful.

M. Delahaye, being asked what, in his opinion, should be done to advance technical education, insists most strongly on the necessity for a diploma. When at the commencement of the century classical education was re-established, every effort was made to give it strength and vitality. The professors and teachers were endowed with liberal salaries; the pupils were attracted and retained by every kind of encouragement — public distributions of prizes, a general competition, inspections, examinations, and diplomas. Nothing of this sort has been done for the other course of study; its students have no evidence to show of their industry and ability. Professional education possesses numerous establishments; special courses at the Imperial Lycées, communal colleges, schools founded by the municipalities, private institutions under lay or ecclesiastical patronage, but it has no diploma.

A diploma could only be granted after a general examination, which would necessitate the establishment of a uniform course of study. What exhibitions do for art and manufactures examinations do for education. At present the teachers employed in giving technical or professional instruction are isolated from one another; they do not know what is being done in other quarters, they can fix no standard for the studies of their pupils, nor find any measure of their progress. All this would be obviated by one uniform programme of instruction. M. Delahaye would recommend that pupils should be admitted to examination for the diploma at the age of 15 years, when, as the dead languages form no part of the course, it might reasonably be expected that they should possess some acquaintance with mathematical science. Up to this time the course of study for the pupils; whether intended for agricultural or industrial pursuits, would be the same; afterwards it would not be too late for them to receive special instruction. The diploma, moreover,

Instruction in drawing.

Opinion of M. Delahaye on what is necessary to organize a system of technical education in France.

Necessity for a general examination and a uniform programme of subjects of instruction.

would owe its existence to the direct intervention of the authority of the State, which could not fail to excite a healthy emulation, not only of the teachers, but also of the pupils. Children are never too anxious to work, and require always a more effectual stimulant than the mere praise or blame of the teacher.

Professional
education to
be general.

Another advantage to be gained by the establishment of a diploma would be the thorough generalization of professional education. At present the danger lies in the subjects of instruction being too soon made special. Professional education to satisfy every one, the producer and the consumer, the manufacturer and the agriculturalist, must be general; to specialize it would meet the wants of one class only. It must have the same programme, whether in the north or in the south. In La Vendée among an agricultural, as in Alsace among a manufacturing, population; yet how can that be if it is confined specially to one object? how would it affect a family who, having been educated in the south, is compelled to migrate to the north?

M. Delahaye recommends the introduction into the primary schools of practical geometry and free-hand drawing, also the establishment of special courses for those who, leaving these schools at an early age, enter at once a trade or factory. For youths who can afford the time and money to remain at school to their fifteenth or sixteenth year, he demands a general education, defined by a uniform programme—an education which will not prevent them from adopting special paths in life, but which will assure to them an effective and intelligent intellectual training.

Evidence of M. Bardin, Professor of Industrial Drawing to the Communal Schools of the City of Paris.

Organization of
the school of
Toulon.

In 1853 M. Bardin was one of the promoters of the Southern Professional School (*Ecole professionnelle du Midi*) at Toulon. This school at the commencement was tolerably well received by the local authorities, who voted a sum of 6,000 francs for the purchase of materials. From the Ministry a grant of 6,000 francs was received as aid towards the payment of the teachers, 3,000 francs of which were for the director, 1,200 francs for the professor of mathematics, 1,200 francs for the professor of drawing and head of the workshops, and 600 francs for a foreman. The terms for boarders were 600 francs a year, and for day scholars 160 francs (this last was only 70 francs at the College of Toulon). The director of the Professional School, who was left entirely to himself,

and without any control over him, collected the money from the pupils, regulated the expenses, drew up the programmes, superintended their execution, and taught the French, English, and Italian languages.

The school was composed—1st. Of a preparatory division comprising two classes, the aim of which was to complete the ordinary elementary tuition and to lay the foundation of superior primary instruction ;

2nd. A special division, in which was given literary and scientific instruction, and instruction applied to the practice of the workshop, the whole during a course of three years' duration.*

The maximum number of pupils who have attended the school were, during the third year, about 100, 50 of whom were boarders and 50 day pupils. They were received in the preparatory division from 10 years of age ; those in the special division were from 14 to 20 years of age.

This school having lasted but three years and a half, only one series of pupils was able to terminate the studies of the special division ; all these are at the present time well placed, some in great industrial establishments, others as contractors or tradesmen ; their actual position is analogous to that of the best pupils of the Schools of Arts and Trades who are employed in industry. These good results, which have only been able to be proved the last few years, were not even foreseen by the public when the school was in existence. It ought to be added that in its last year it had lost much in general estimation by some of the pupils having been refused by the Commissioners for the examination of the candidates for the School of Arts and Trades at Aix. These youths were perfectly prepared, and would have done honour to the School of Toulon, but the pupils of the colleges, who were examined by their own professors, were preferred before them.

Satisfactory results.

It must be remarked that the position of this school has

Indefinite position one of

* The literary instruction comprised the following studies :—Moral and religious tuition, the French, English, and Italian languages, the history of France, and commercial geography.

Scientific instruction :—Arithmetic, elementary geometry, descriptive geometry and its applications, algebra, trigonometry, analytic geometry, machinery, chemistry, and natural philosophy.

Applied Instruction :—Technology of the industries of the South, architectural construction, machine manufacture, commercial and industrial accounts, industrial drawing.

The labours in the workshops were :—Engine fitting, iron turning, joinery, modelling, carpentry, wood turning, stone cutting, and modelling of ornaments.

Works of small dimensions were intended to help to form a museum for the instruction of the pupils.

the causes of closing.

never been well defined. The State gave an annual subsidy, and paid at the same time 15,000 francs for the appropriation of the premises, which were thought to be hired by the town, but which the director had taken in his own name. Being pressed to alter such an anomalous situation, the municipal council at last consented to pay the rent; but this liberality was not of long continuance, and when, upon the reiterated demands of the director, the minister commissioned the corporate body to re-organize the establishment, there was a formal refusal on the part of the town. On the other hand, the Department, which had shown its co-operation by a grant of 4,000 francs, could not take the entire responsibility of a school abandoned by the corporation of a town containing 80,000 souls. The minister then withdrew his subsidies, and the director took the determination to suspend the classes and send away 80 pupils (March 1857) rather than keep it open as a private school, although certainly a good organization would have assured its success. When this school was closed it was only a few thousand francs in debt for rent.

Statistics of the drawing classes in Paris.

Instruction in industrial and art drawing is given to the apprentices and workmen of the capital in the establishments kept by the Minister of State, by different associations, and by the city of Paris; besides which there are classes for workmen and free establishments.

They may be classed as follows:—

	Number of Schools.	Number of Pupils.	
		Art Drawing.	Geometrical Drawing.
1st. Imperial and special school for drawing (gratuitous) - -	1	320	150
2nd. Courses of the polytechnic and philotechnic societies - -	5	120	60
3rd. Schools for workmen and private establishments - - - -	5	100	400
4th. Ecclesiastical communal schools -	15	700	200
5th. Lay communal schools - -	18	1,000	250
6th. Private schools receiving subsidies from the town - - - -	6	530	20
Total - - - -	—	2,770	1,080

Therefore, for artistic and geometrical drawing there is now a total of 3,900 pupils. The number of pupils admitted in the course of the year is about 10,000.

1. The imperial and special school of drawing is dependent upon the Minister of State; it is completely gratuitous, both

Imperial school of drawing.

for those who attend it in the day and in the evening. The day instruction, which is from eight in the morning to one, consists of mathematics and drawing.*

The students are mostly pupils for architecture, sons of contractors, makers of objects of art, and young men who are preparing for the different branches of study of the School of Fine Arts (*Ecole des Beaux Arts*). The class rooms are well adapted for the purpose for which they are used, and the models put before the pupils are well chosen.

The evening classes,† which are intended for young men and workmen who have no time in the day, are well arranged and the tuition is very good: they are of great value. Geometrical drawing is limited to that which applies exclusively to architecture, and no one under 15 can frequent the school.

The number of pupils who attend the courses, both in the daytime and at night, are from 400 to 500, about 250 of whom are very regular; from 1,200 to 1,500 are admitted in the course of a year. A great number of the pupils attend several courses at the same time. There are 15 professors and assistant professors.

2. The Polytechnic Association keeps up several classes of artistic and industrial drawing, which appear to be meant to complete the scientific instruction given gratuitously by the association. The number of free pupils in the classes actually working is about 50 for art drawing, and 20 for geometrical drawing. The Philotechnic Association has also two

Classes of the Polytechnic and Philotechnic associations.

* The principal subjects taught, and the number of pupils who actually attend them, are:—

Mathematics, geometrical drawing	-	-	-	60
Art drawing (copy), ornament, plants, animals, figures, academy studies	-	-	-	100
Drawing from memory	-	-	-	20
Drawing from the cast	-	-	-	50
Drawing from nature	-	-	-	80
The modelling of ornaments and academy studies	-	-	-	40
Engraving on wood	-	-	-	20
Total	-	-	-	370

† The subjects of instruction, and the number of pupils who attend them, are as follows:—

Geometrical drawing	-	-	-	70
Architectural drawing	-	-	-	80
Artistic drawing, copy of figures, animals, plants	-	-	-	180
Drawing from the cast	-	-	-	50
Drawing from nature	-	-	-	80
Ornamental composition	-	-	-	20
Modelling of ornaments and academical studies	-	-	-	50
Total	-	-	-	530

classes, the one for artistic, the other for industrial drawing. In each of them there are three lessons a week given by different professors, independent the one of the other. These courses are especially attended by pupils who follow some of the other classes of the association. About 70 pupils attend the classes of art drawing and 40 those of geometrical drawing.

Schools for
workmen and
private estab-
lishments.

3. Journeymen carpenters meet together in the winter in rooms, that is to say, in the room of one or the other of them, or in an apartment hired in common, to study outlines under the direction of a head workman, who gives his evenings gratuitously to instruct his fellow workmen. Stonemasons have also schools of this sort, but in very small numbers; some are gratuitous others require payment. Those in which the masters demand a sum of 8 or 10 francs a month are generally attended by workmen to whom the stonedresser promises work during the bad season.

Studies pursued by workmen in common have this good in them, that they give them practice. The sketches copied by the pupils are afterwards applied, that is to say, that each workman executes the subject of which he has drawn the outline on a small scale, and it is often only after having completely terminated it, that he thoroughly understands his sketch; but even though it might have been understood from the commencement, the cutting of the model is very useful, for it necessitates the tracing of the pieces and the finding out the order in which they are to be executed. These schools, of which there are but few in Paris, only give instruction in two or three trades; they, however, as well as the trades union societies, have a tendency to disappear.

Some clerks of works or architects have also evening schools for masons, contractors' clerks, &c.; the drawing they teach is specially adapted to the trade of each; the terms are usually six francs for a month of the course, which comprises six lessons a week, of three hours each. Some of these schools have a name amongst the workmen, although their practical teaching is otherwise limited. In the absence of all statistics of these schools, the number of pupils who attend them may be fixed at about 500.

Drawing in
ecclesiastical
schools.

4. The city of Paris has instruction in art drawing given to apprentices and workmen in 15 communal schools, kept by the Christian Brothers; this is generally composed of the copy of ornaments and heads, also drawing from the cast; in 10 of these last they have mechanical drawing as well; the number of pupils attending the classes in art drawing is about 700, whilst for geometrical drawing there are only about 200. Two of these schools

have special classes for apprentices, the others receive simultaneously artizans and apprentices. The lessons are given five days in the week, from 8 to 10 in the evening.

5. Of the 18 drawing classes which are kept up gratuitously by the city of Paris in the lay communal schools, six give instruction in art drawing alone, one of which is particularly for apprentices; 11 teach geometrical and art drawing, and one only confines itself to industrial drawing. About a thousand pupils attend the instruction in art drawing, and 250 that in geometrical drawing. All the classes are held three days a week, from 8 to 10 ten in the evening. The young men who attend them are generally apprentices and workmen of different trades, some are clerks of architects, contractors, surveyors, draughtsmen, and designers.

Drawing in the lay communal schools.

There does not appear to be any disadvantage in causing both workmen and apprentices to meet in the same class, for apprentices rarely understand the utility of application, and they are encouraged by the industrious workmen who frequent the classes.

Mixture of apprentices and workmen.

As regards the schools for industrial drawing, of which M. Bardin himself has the charge, one is in the Rue du Bac, and receives apprentices and artizans, who can also learn there art drawing; the other, in the Rue du Renard-Saint-Merry, (quartier de l'Hotel de Ville),* gives industrial drawing alone; the first dates from February 1859, and has upon an average for the whole year 60 pupils present; the second, opened in October 1860, has on an average 50 pupils.†

Schools for industrial drawing.

* The school in the Rue du Bac, being situated in the centre of the Faubourg Saint Germain, draws its pupils from the distant *quartiers*, principally from Gros-Caillou, Vangirard, and the Boulevard Mont-Parnasse.

The school in the Rue du Renard-Saint-Merry is in the centre of the locality where are manufacturers of the fancy articles (*articles de Paris*), jewellery, and silversmith's work; it does not render as much service as it would if it was in an industrial *quartier*, in the proper sense of the word.

† The number of pupils inscribed in the two schools since their opening is as follows:—

Pupils grouped according to the Nature of the Work.	YEARS.							
	1859-60.		1860-61.		1861-62.		1862-63.	
	Rue du Bac.	Rue du Bac.	Rue du Renard.	Rue du Bac.	Rue du Renard.	Rue du Bac.	Rue du Renard.	
Ornament - -	67	77	—	82	—	75	—	
General drawing - -	17	21	48	25	39	23	55	
Construction - -	10	11	16	20	23	26	17	
Workers in wood - -	22	29	7	38	16	39	23	
Workers in iron - -	24	32	31	45	37	48	36	
Total - -	140	170	102	210	115	211	131	

Apprentices
more numerous
in artistic
trades.

If the number of apprentices and workmen are compared, we shall see that the one about equals the other; but there is this difference, that for artistic trades the number of apprentices is about double that of the workmen; whilst, on the contrary, the number of artisans is far more considerable in industrial trades. The reason of this difference is that in all artistic trades the apprentices require drawing from the very beginning, whilst for the working of wood and iron they are generally only employed in common work and filing; the outlines which are necessary are done by workmen. As many of the children when they leave the primary communal schools have not the least notion of drawing,* and as

Ornament.—Tapestry workers, pattern drawers for embroidery, chasers, engravers, wood carvers, gilders, silversmiths, jewellers, painters, ornamental and porcelain painters, tailors, pastrycooks, and bookbinders.

General Drawing.—Organ makers, lithographic printers, autographic and lithographic draughtsmen, engravers, house painters, watch makers, and draughtsmen.

Construction.—Masons, stonemasons, surveyors, architects, clerks, &c.

Workers in Wood.—Joiners, cabinet makers, carpenters, and coach-makers.

Workers in Iron.—Iron plate makers, locksmiths, mechanics, plumbers, blacksmiths, turners in metals, mathematical instrument makers, and watch-makers.

The teaching
of drawing in
the primary
schools in
Paris.

* Programme of elementary instruction in the Department of the Seine.

WEEKLY TIME TABLE.

Subject.	1st Class.	2nd Class.	Observations.
Moral and religious instruction	Hours. 5	Hours. 5	
Reading	4	10	
Writing	3	10	
French language	5	—	{ Orthography: 5 hours for the most advanced pupils.
Arithmetic and metrical system	5	5	
Linear drawing	3	—	{ 5 hours for the most advanced pupils.
Singing	3	—	
History and geography	2	—	
Total	30	30	

There is a question of replacing a part of the writing lessons by linear drawing for the most advanced pupils in the time table of the second or elementary class. In the first class, three hours, and afterwards five hours a week are given up to mechanical drawing.

1st. *Primary lay schools.*—In the greater number of schools the programme as regards drawing is a dead letter; they either do not do any at all, or they teach the bare elements of ornamental drawing. Some others are limited to the tracing of geographical maps; in others it is the mask for architecture and machines, which is most taught; in other places the attention is given to academy studies with the two crayons. The Administration, however, fur-

they do not then feel the necessity of learning it, they do not come to the classes till they are 15 or 16; ashamed of being ignorant of the first principles of their art, many at this age begin to work seriously to make up by their assiduity for the time lost.

Industrial drawing as taught in the schools under the direction of M. Bardin comprehends, as principles common to all the pupils, the study of descriptive geometry and that of solid bodies; then comes drawing adapted to each trade.

Models with descriptive texts.

The results that were obtained in the first few years were extremely small, for the want of good copies to put into the hands of the pupils; at the present time, thanks to the collections of drawings prepared with the view of teaching workmen, and of the new methods that have been adopted, the success has been more apparent. Unfortunately the school is located in rooms which are used for several different purposes; notwithstanding this inconvenience, however, beginners make such rapid progress that they are soon able to understand the explanations of geometrical exercises. It may sometimes happen that these explanations are not perfectly apprehended by the youths who have been badly prepared, and are consequently not familiar with the prin-

nishes, upon the demand of the teachers, compasses, rules, and squares for the mechanical drawing; but of method, there is none. The programme does not speak of drawing of ornament, but a few models are provided for it, and it is done a little in all the schools, because the programme of entrance to the Chaptal College and to the Turgot School requires the execution of a drawing of ornament, and the pupils of the communal schools take part in the competitions for admission to these establishments.

2nd. *Ecclesiastical schools.*—In the ecclesiastical schools the masters are better able, by their position, than laymen, to do what is really useful; they write text books for use in their own schools, and especially text books on the drawing subjects. Both ornamental and linear drawing are taught at their schools, but not very efficiently, and the results that they obtain are only moderate; instead of acquiring good, solid, well-developed principles, the children lose time, which is very precious, in copying from models, elevations of houses, churches, and complete machines. Locomotives, shaded, are in great favour, but the teacher, who, by his position, is not acquainted with manufactures, is not competent to understand the movement of the different pieces which compose them. The only visible result of this work is to flatter the parents who, upon these matters are very incompetent themselves, by showing them the little master-pieces of children of 12 years of age. All this requires reform.

Good instruction in drawing in the primary school would have considerable influence upon the professional prospects of apprentices, for, if they had the feeling of its value when they leave school, and even before entering on their apprenticeship, they would more assiduously attend the evening schools, of which they do not now know all the importance.

What good drawing ought to be.

The course of drawing in the primary schools ought to be general; it ought to be applied so as to give the principles of art drawing as well as geometrical drawing; and without employing more time than is marked in the programme, the well-trained teachers having at their disposal proper models, would certainly obtain good results.

ciples, but at any rate they soon learn to understand that geometrical drawing does not consist alone in a single copy or in drawing to a given scale; and, as all the models that are put before them are accompanied by a descriptive text, each of them comprehends and retains what he studies. He can work alone, the professor has only to correct the work or to explain a point which has not been understood at first. These models, thus explained, have an immense advantage over an engraving which does not even bear an indication of the drawing that it represents; besides which a text accompanying a drawing is always more precise than the oral description that the master can give to each pupil, and helps to keep alive the remembrance of it.

Applications
to different
trades.

As soon as the general instruction is terminated, the pupils are grouped according to their trades; workmen in wood, in iron, builders, &c. It is then only that each one learns the drawing bearing on his trade, at the same time that, in succession, they pass an hour at the black board in order to learn to sketch the objects, parts of machines or scarves which have reference to their trade.

Advantages of
having lay
masters for the
teaching of
technical
drawing.

In reply to the question as to the analogy between the instruction given in the schools of the Christian Brothers and that in the schools which he directs, M. Bardin states that the schools themselves are alike as to the organization of the classes; they are all communal and gratuitous to the pupils, apprentices, and artizans who attend them; the town undertakes the expenses of the premises, material, and lighting. But there is an immense difference in the instruction; for, in order that drawing may be useful to the working population, the professor must not only know that art, and how to teach it, but he must also have an exact idea of a great number of trades; this is why laymen succeed so much better as teachers than ecclesiastics. The instruction to be given to the pupils is multiform and ever varying; each artizan requires to know special things, and desires for this reason to follow those studies which bear completely upon his business, and these are so different that, in a school of a hundred pupils, there are hardly to be found 10 of the same trade.

Lay professors are all artists, painters, sculptors, or art workmen, knowing not only how to draw, but understanding manufactures also; they can consequently direct the instruction of their pupils with a view to their special needs. Though until now the communal schools have only produced a few good results here and there, the bad accommodation is the cause of this; they have no special rooms, proper material, good lighting, or sufficient number of models. Some of the ecclesiastical schools are much better furnished than ours; they

have rooms for the purpose, well situated, and the most complete collection of models that it is possible to procure in the present day. Notwithstanding this, their results are inferior for the reasons that have been pointed out, and those which have no special accommodation produce no results at all, especially in geometrical drawing.

Ecclesiastics are capable of instructing the children of the elementary schools, even of teaching general drawing; that is to say, drawing which relates to science only, without any practical application. In this way the studies that apprentices and workmen pursue with them can only be general and elementary, but when these teachers attempt to go beyond the elements, they miss their aim. And this is not astonishing, for they are neither artists nor handicraftsmen, and for the most part have not followed any special studies. In Paris, excepting two or three of the Brothers, who are looked upon by their order as masters of drawing, they are not in a position which could allow of their turning out distinguished pupils. We must not then seek for technical instruction for apprentices and artizans at the hands of ecclesiastics; they do not possess it, for they have not studied those numerous trades that are to be met with in practical industry. Skilled workmen who attend to complete their artistic and technical instruction, and foremen seeking for information to commence a new work which presents serious difficulties to them, are not to be found in their classes. As to the number of apprentices who frequent their courses, it is entirely explained to those who know that the Brothers have 40 communal primary schools (without counting those that are kept up by the parishes), and that they give elementary instruction to about 12,000 children, whom they afterwards enrol in the different societies of which they are the head, and whom they have no difficulty in making attend their classes for apprentices.

Incompetence
of clerical
teachers.

There are different causes for the irregularity of the attendance: at certain periods their work prevents the pupils from coming to the classes; sculptors, mechanics, joiners, and locksmiths only attend in the winter.

Irregular
attendance of
apprentices at
the classes.

Apprentices might very well come to them all the year round, but they leave them in the summer out of carelessness, and that they may follow the example of the workmen. The professors have no hold upon them, and have no power to retain them, and, with very rare exceptions, they do not find either in their parents or their masters sufficiently intelligent and zealous auxiliaries.

If the workmen paid, however small the sum, they certainly would be more regular in their attendance at the drawing

Disadvantages
of gratuitous
instruction

as regards
punctuality.

classes than they are now, and the instruction would be regarded more earnestly by them; this is a fact which has been attested by experience. This system has, besides, numerous precedents; the workmen in their practical courses take upon themselves the expenses of the premises and lighting; the private schools receiving subsidies from the town, have about 350 pupils who pay; moreover, a great number of workmen who enter their names for the courses of the communal schools come with the intention of paying.

The only objection that could be made is in favour of apprentices, because they earn nothing; this is true, but for those whose families could not afford these expenses the masters, who give a little money every week to the youths working for them, as a recompense, would willingly pay the monthly fee of the school (which might be as low as possible), and would also undertake to see that the apprentice profits by the advantages offered to him.

Salary for the
professors of
the municipal
schools of
drawing.

The professors of the lay schools, and the Brothers who teach drawing, receive a grant, which is regulated by the average number of pupils present at the classes, at the rate of 10 francs a year for each pupil. In case of illness or of holidays the professor is obliged to give up the whole of his salary for the time to the person who supplies his place. The salary varies from 200 to 2,000 francs, according to the position of the school where the drawing classes are held.

They amount annually about as follows:—

ECCLESIASTICAL SCHOOLS.

	Francs.
1 class to about	2,000
1 " "	1,200
1 " "	800
4 " "	550
3 " "	300
4 " "	200

LAY SCHOOLS.

	Francs.
3 schools to about	1,200
4 " "	1,000
4 " "	600
1 " "	400
6 " "	300

Private schools
receiving sub-
sidies.

Independently of the courses of drawing kept up by the ecclesiastical and lay schools, the town gives grants to six schools, which contain about 550 pupils (2nd, 3rd, 4th, 10th, 11th, and 12th arrondissements). They all of them teach art drawing; at three of them the model of figure and ornament; the schools of the 3rd and 10th arrondissements have a course of drawing from nature, and that of the 3rd arrondissement completes its instruction by a course of anatomy. These schools, which exist since 1835, have each of them grants of 3,000 francs from the town on condition that they will give gratuitous instruction to 60 pupils; those

of the 3rd, 10th, and 11th arrondissements, have above this a fixed sum for gas.

All the expenses, such as rent, providing and maintaining the apparatus for light, the purchase and care of models, lithographs, busts, and other necessities are at the charge of the directors. The classes of the 3rd, 10th, and 11th arrondissements, receive pupils who pay two francs a month for three lessons a week, and three francs for six lessons of two hours in the evening. The courses of the 2nd, 4th, and 12th arrondissements have only three lessons a week each. Some of these schools, for example those of the 3rd, 10th, and 11th arrondissements, obtain very satisfactory results.

Drawing schools giving special instruction adapted to each trade would render excellent service if they were well organized and the work well arranged; under these circumstances they would be attended by a great number of young men employed in machine works and factories and by apprentices and artizans. The young men would obtain a technical instruction for which they would find daily application. Apprentices, whose intelligence would come to the help of their skill, would comprehend better and execute more accurately the works which were confided to them, and would make more able workmen. Some of the workmen might become the partners or the rivals of many small tradesmen who only owe their position to their fortune, while the greater number would have the level of their technical instruction raised, and the execution of the works which they turn out would be considerably improved.

Importance of technical drawing schools.

M. Bardin, replying to the question what should be done to improve the drawing schools in Paris, says:—"About two years back I most seriously studied the question of the improvement of the drawing schools of Paris, and the conclusions to which I then came are, in my mind, the only practicable ones. If we do not take into account the pupils who attend the classes of the Imperial School, and those of the workmen's schools, there remains a contingent of 2,700 pupils, apprentices, and artizans, 1,700 of whom are for art drawing, and 450 for geometrical drawing, attending the courses of the city of Paris. These schools in their present position hardly appear susceptible of a beneficial organization; for special premises, which are quite indispensable for this kind of teaching, are wanting or are not to be found. The schools are too numerous to be well furnished with materials, and each of them, whether attended by many pupils or not, has but one professor. Such a professor can undoubtedly give general instruction, but, for special teaching, could undertake very few trades; hence it follows that

Desirable re-organization of the drawing schools in Paris.

geometrical drawing, taught by artists in the 10 schools, is a failure."

"The private schools which receive grants are really special schools; but I do not think that by augmenting them we should find a remedy for the evil I have pointed out. The most profitable to their directors are those that have very few pupils, for, in this case, the expenses for rent are small, and the outlay for material and models is scarcely anything. For those, on the contrary, that render great services and that have from 100 to 150 pupils, the expenses of rent, material, and models are important. We cannot admit that the same professor could watch over 150 pupils at the same time, and could teach them properly in the two hours only that each lesson lasts ornamental drawing, heads, flowers, landscape, ornamental and head drawing from the cast, modelling of ornaments, heads, and academic studies. The directors ought to have assistants, but these assistants can only be expected to render service if they are sufficiently paid, and this is not possible in the actual state of things."

"The helpless condition of the existing schools, and the necessity that exists, and that becomes more and more pressing, for all industries to have well instructed foremen and skilled workmen, render it impossible to hesitate to demand a largely extended organization of drawing schools in Paris."

The advantage of transforming the schools which receive grants into special schools of the town.

"The transformation of the actual courses into special schools created by the town, or by the Government, or rather by both, for which the pupils, workmen, and apprentices would pay, would solve the question. Twelve special schools would suffice under the present state of things. They would be sufficient for all the *quartiers*, so that the pupils, for the most part, would not have more than a quarter of an hour's walk to go to them. Then the 2,700 pupils spread over these 12 establishments would give to each of them an average of 225, without taking into account those who do not go to drawing because they do not find instruction to suit them, and who flock to better schools where the teaching is more complete."

Project of arrangement according to the kind of industry.

"It would be very easy to manage that each school should, by its situation, answer to the particular industry of which it was the centre; thus, the one in the quartier Saint Denis should take especially engravers and chasers upon metals, jewels, and precious stones; that of the Marais, jewellers; of the Faubourg Saint Antoine, cabinet makers; of the Faubourg du Temple, bronze workers; of La Chapelle, mechanics, wheelwrights, and locksmiths; of Gros-Caillou,

mechanics, locksmiths, and joiners; of the Boulevard Mont Parnasse, locksmiths, joiners, and so on. Each school would thus have (besides those of different trades) a good number of workmen and apprentices of the same trade whom it would be possible to instruct properly. Each school might comprise two divisions; the one for art and the other for industrial drawing. The first division subdivided into several sections should comprehend the drawing of ornaments, flowers, animals, landscapes; the academic study from the model, cast, or nature; courses of botany, anatomy, the composition of ornaments, and also the modelling of ornaments, animals, and academic studies. The second division might also have different sections, in which would be taught the geometrical drawing of surfaces and solids, general drawing, special drawing, useful to constructors, workers in wood, iron, &c. In this way it would be possible to have courses adapted to all the different kinds of trades; of architectural construction, mechanical technology, &c., which could not be done in schools having but one master and a very small number of pupils for each specialty. Schools thus organized under fixed rules should be given over to directors as is done in England; or else professors under the immediate direction of the town or the Government might be appointed to teach in them. Their number should be in accordance with that of the pupils and their professions (whether artistic or industrial) should be chosen in reference to the wants of the different *quartiers*.

“The system of payment which appears the most rational would be that in which the salary is composed:—First, of a fixed sum, whatever may be the condition of the school; next, of a conditional sum or subsidy proportioned to the results obtained (this sum might reach at the highest to a quarter of the fixed salary).”

Project of
financial
organization.

“It appears indispensable to the success of certain schools that the pupils should pay fees. The premises should be specially built, and the furniture of tables, gas, &c. as good as possible. The most perfect copies (engravings, reliefs, academic studies) corresponding to the different sections of the programmes should alone be furnished to the schools. To one of the schools situated in the centre of Paris a museum of objects of art and industry adapted to instruction might be annexed, also a library of classical works, which should be at the disposal of all the other schools; at the same time it would be well to institute a permanent exhibition of the works done by the pupils. The general arrangement, lighting, material, and models for a school should cost 8,000 francs. The staff, lighting, and maintenance of the material would occasion an

annual expenditure of about 10,000 francs for a class of 400 pupils; and these would bring in, taking the lowest figure of 20 francs a year per pupil, 8,000 francs. The keeping up of each school would thus be 2,000 francs, *without including the rent*. The education of a student according to this would cost 5 francs a year, while actually, in the gratuitous ecclesiastical and lay schools, it amounts to 15 francs, and in the male schools that receive subsidies, 64 francs."

Replying to the question as to what should be done for apprentices, M. Bardin thinks that the division of labour, which is so advantageous for cheap production, causes each branch of the trade to become more and more a specialty. It is stated that there is at the present time a great dearth of skilled workmen, particularly in the manufacture of philosophical and horological instruments. If the want of good workmen is discouraging to certain trades, it is also a very great disadvantage to the men only to know a little of their business, and consequently not to be able to procure work which does not exactly belong to their specialty. It is, therefore, most necessary to give complete instruction to the apprentices, but this is rarely met with in the present condition of industry. In a great number of trades apprenticeship lasts for three or four years; the master has several apprentices, the last comer of whom is, for a third of his time at least, a mere servant. He begins to work in the middle of the second year, and finishes his apprenticeship at the end of the third. He ought by this time to be able to support himself, a thing which is impossible to him under such circumstances.

M. Bardin is able to prove, by a statistical abstract of the apprentices who enter themselves for his classes, that only one in every fifteen is bound by a contract to his master, and *vice versa*. All the others have only verbal agreements. Some even have not any fixed time for the duration of their apprenticeship; it varies according to the trade, the age of the child, and according to whether he is boarded and lodged or not, from two, to three, four, or even to five years. In the face of such negligence on the part of the parents, there is but little to be expected from them towards the improvement of apprenticeship. Is it then to be expected that the masters will be more careful? At the same time, though things are thus in a great number of trades in Paris, happily, in the provinces apprenticeship is not quite so bad.

There are several ways of bettering the moral and social situation of the apprentice. In manufacturing towns private societies might be formed, as at Nantes and Amiens, to draw up contracts of apprenticeship, to watch over the execution of

Apprenticeship has a tendency to become special with a division of labour.

Apprentices employed to run errands.

Disuse in Paris of the contract of apprenticeship.

Desirable intervention of the societies of patronage in the contracts

them, see that the apprentices attend the evening schools, and, in case of an infraction of the contract on the part of the master, take the interests of the apprentice in hand. Besides this, where small trades predominate, the Government and the Departments ought to encourage the manufacturers to create, close to the workshops for artizans, workshops for apprenticeship under the management of experienced and conscientious foremen. The youths would have no contact with the workmen, they would work about eight hours a day, would pass two or three hours in the study of drawing, and would receive besides lessons in French, arithmetic, &c.

Workshops might even be formed in which apprentices might be put to a certain number of trades. The proceeds of the manual labour should go to the profit of a contractor, who would furnish the raw material and pay a certain sum to the director for the workmanship. By the aid of this system, without asking any longer time from the parents than that which is now given to apprenticeship, the price of the workmanship of the articles made by the pupils would be sufficient to provide them with food and clothing.

If some gratuitous establishments of this kind, founded by ecclesiastics, have not succeeded, the reason is that they not being themselves in trade have not been able to dispose advantageously of the products manufactured. These charitable establishments take children very young, and they are five, six, or even seven years before they can employ them in really profitable work.*

Examination of the Rev. M. Meyer, Protestant Minister, Ecclesiastical Inspector, President of the Apprentice Mission of the Church of the Confession of Augsburg.

The first school in connexion with the Protestant Church of the Confession of Augsburg was founded in July 1847, in the Rue Neuve-Ste.-Geneviève; it comprises at the present date (1863) seven school classes accommodated in immense buildings, and attended by nearly 600 children.

Account of the schools in connexion with the Church of the Augsburg Confession.

* M. Bardin then goes on to give an account of the Science and Art Department, its organization and action with regard to technical instruction in England. He also gives a description of the South Kensington Museum at the time of his visit to England in 1863, and general statistics of the Science and Art schools in connexion with it. Since this date great modifications have been made in these institutions. A full account of the action of the English Government in aiding scientific and art instruction will be found in the "Notes by the Editor," at p. 14, and in Appendix A. at p. 163 of the preceding volume, containing the Report of the French Commission; it is therefore unnecessary to reproduce here M. Bardin's evidence on this subject.

The school fee is one franc per month, a sum manifestly insufficient to defray the expenses of the establishment, which is therefore chiefly supported by voluntary donations; it is found to be better in principle to insist on some payment from the parents, however small it may be, rather than to give gratuitous teaching. The character of the instruction is essentially professional, in that drawing and commercial arithmetic are taught in their higher branches to the boys, and sewing to the girls; the drawing includes that of ornament and geometry, and in some cases of machines; in mathematics the pupils go as far as square and cube root and algebra. Particular attention is paid to writing.

Boarding
houses at-
tached to the
schools.

In order to give children residing at a distance, and children without parents, the opportunity of attending the schools, boarding houses both for boys and girls have been established, two in connexion with the schools in the Rue Neuve-Ste.-Geneviève, and four in other parts of Paris. The boarders pass through the ordinary school course; they pay for their board in the Rue Neuve 25 francs, in two of the other establishments 22 francs, and in the remaining two 20 francs per month. This sum is just sufficient to cover the expenditure on behalf of each child; the charity has to defray the rent and the salary of the superintendent. The age of admission to the schools varies from two and a half to fourteen years; an infant school (*salle d'asile*) has been established for the young ones.

Action of the
mission after
the children
leave school.

When the children leave school the Mission undertakes the apprenticing of them, for which purpose a committee is specially formed consisting of charitable men who, themselves engaged in business, have derived their experience of life in the workshops and of the dangers of apprenticeship from their intercourse with the working classes. It is the duty of this committee to draw up the indentures of apprenticeship, and to see that they are properly executed. At least once a month some members of the committee visit the different workshops, and on printed forms prepared for the purpose make notes on the conduct, ability, and industry of the apprentices who are employed there.

Every Sunday all the children, both those at school and the apprentices, assemble in the schools for religious instruction; attempts have also been made at these meetings to give instruction in the elements of chemistry and physics. Occasionally fêtes and excursions are organized for the children, and choral societies have been instituted among them. It may be noticed that many of the elders undertake of their own accord, and out of kindness, the teaching of their younger comrades.

The Mission endeavours to maintain their hold over their pupils even after they have finished their apprenticeship and become journeymen; to enable them to accomplish this they have commenced the formation of working men's societies on the same principle as those established in Germany. The object of these societies is entirely moral and religious; they contain no political element whatever. With the same intention, and to prevent young working men from being led away by the numerous temptations which abound in a large city, a kind of lodging house, or as they call it *famille ouvrière*, has been opened in the Rue-de-Charonne by the committee of apprenticeship; here young artisans who have no family of their own are boarded at a low rate and find the comforts of a home. To be admitted to this institution, the young man must be well recommended and have testimonials of good conduct; once an inmate he must conform to the regulations and hours of the establishment. Apprentices are admitted at a fixed rate of 35 francs per month; journeymen pay for their food according to tariff, and an additional sum for their apartment, which varies according to the number of beds it contains. These sums just suffice to defray the expense of the provisions consumed in the house; beyond this, rent and furniture have been a charge to the committee. About two-fifths of the whole number of inmates are journeymen; they are eager to be admitted and are so well cared for that a great number of applicants have unfortunately been refused admission for want of room. The Mission in face of an annual deficit hesitate to enlarge the establishment. They have, however, been able to open an institution of the same sort, analogous to what in Germany is called a *Herberge*, specially for the German artisans, of whom there are many in Paris. In this lodging house, as well as in the primary school of the Faubourg-Ste.-Antoine evening classes have been opened, and want of funds alone prevents the establishment of others.

Action of the mission after the expiry of the apprenticeship.

In reply to the question as to what in his opinion is required to improve the condition of professional education, M. Meyer insists in the first place on the necessity of children being kept longer in the primary schools. In the Roman Catholic Communion they generally leave school at the age of 12 years on their confirmation; in the Protestant Church they are only confirmed at 15 years old, and he is anxious to be able to retain them at school until that age. Professional instruction cannot be commenced until primary education is completed. In the second place he desires that charitable societies which undertake the apprenticing of lads should be armed by law with greater powers; at present

Opinion of M. Meyer on the condition and wants of professional instruction.

when, as frequently happens, masters neglect or take advantage of their apprentices, the society has no legal right to interfere, and its action is limited to mere advice. Lastly, he would recommend that the apprentices should be allowed greater liberty in the evening, in order that they may pursue their studies in the night classes without being fatigued by their daily toil as they now are. Sunday also he wishes to see given up to rest, and the Sunday schools, of which he knows the benefit in England, well attended; an apprentice who goes to his master's shop on Sunday morning to clear up and make things tidy, is often under one pretext or another kept at work until noon, and sometimes the whole day.

Besides the Church of the Confession of Augsburg to which M. Meyer belongs, the Reformed Church possesses a similar mission superintended by a most eminent man, the Baron de Triquetti.

Examination of Messrs. Gaumont and Guémied, Editors of the Journal of Professional Education.

Number of
children in
Paris attend-
ing school.

In the year 1862 there were at school in Paris 143,705 children between the ages of 6 and 13; of these 121,709 attended the primary schools, while between 12,000 and 15,000 were being educated at home, at the lycées, or at the secondary boarding schools. It follows therefore that of these children only one in ten is fitted to receive what the university calls professional instruction. There is therefore great cause for inquiring in what way the present system of primary and secondary education can be modified to fill the gap which exists between general and special instruction.

Professional
schools.

There is no doubt that one of the first indispensable requirements in children who are to receive a professional training is a knowledge of the elements of the sciences, such as geometry, physics, and chemistry, in a degree adapted to the wants of any special industry. For this purpose schools on the plan of the Turgot school should be multiplied in the great manufacturing centres, Paris, Lyons, Nantes, Bordeaux, Lille, and Mulhouse. A preliminary training of this description is required even by children who are destined for the handicrafts. Every manufacturer knows the difference between an apprentice who has been thoroughly accustomed to scientific definitions and one who can merely read and write; even in learning the use of tools the former is twice as quick as the latter, besides understanding more easily the explanation of the master.

Now in considering the necessities of industry, and the conditions under which producers should be placed in order that their work may be profitable to themselves and to their country, it is evident that the originator of an idea and he who has to execute it must possess (perhaps in different degrees) both general and special knowledge, both theory and practice; they must in fact be able to speak the same language to work together for the same object. Besides as an individual rises on the industrial ladder, he must, under pain of falling, continually know more; the manager of works must possess at the same time the manual skill of the artizan, the power of dividing the work of the foreman, and the science of the engineer. On this ground therefore manual labour, which is the foundation of all industrial operations, must also be the base of professional instruction.

Need for the introduction of manual labour into schools.

It is often objected that by the reason of the great varieties of operations in manual labour it would be hopeless to find an individual endowed with an aptitude or sufficient flexibility of the organs to learn them all. But, according to the ideas of M. Gaumont and the gentlemen who think with him, the processes of all manufacturing industries can be reduced to a certain small number of identical manual operations. Thus the processes and tools employed in working in metals have many analogies with those used in working in wood; for example, whether a workman turns in metal or in wood, —whether he turns by the aid of the bow, of the foot, or of a machine moved by steam power,—the operation reduces itself to nearly the same method of manipulation. So in fitting it always depends on a correct eye and manual skill; and the individual who can fit a piece of iron by means of the file will soon fit a piece of wood with the aid of plane and chisel. Thus both in technical and apprentice schools can be taught the fundamental manual operations which are employed in all manufactures. Turning and fitting would form the practical portion of the instruction, geometry and linear drawing the theoretical part, and the elements of general technology the higher and finishing part.

Objections combated.

If we consider manual labour merely as a means of instruction it will still find a place in the technical school. A knowledge of manipulation is required in the chemical art; why should it be otherwise in a knowledge of the construction of machines and buildings? It is only possible to teach by four methods: 1st, oral explanation given by the teacher; 2nd, written explanation taken from books; 3rd, graphic explanation rendered by drawing, and 4th, practical explanation obtained from execution. Up to the present time only the first three methods of demonstration have been

Manual labour as a means of instruction.

employed, and nothing but theorists produced; the moment that it is desired to train practical men the fourth method will be added, and technical instruction will have been founded. Every technical school must admit into its course the manual labour of the workshop and of the laboratory; that is its distinctive characteristic, the cause of its existence. This principle admitted on general grounds, it becomes still more incontestable when applied to special industries; machine manufacture, building, dyeing, weaving, &c. require not only a knowledge of applied science, but also a practical acquaintance with manual operations. Thus by the side of industrial schools with general programmes there must exist special schools for particular trades, established like the first to train managers and foremen; then for a lower class apprentice schools and public courses of lectures for workmen, whether apprentices or adults.

Desirability
of providing
artisans with
the means of
acquiring a
scientific
knowledge of
their trades.

For managers and overseers the means of obtaining this kind of training are already provided. Besides the schools of arts and trades, those in the towns of Mulhouse, Charleville, Nancy, Reims, Castres, Douai, Lille, Ménars, and Marseilles have workshops attached, and should they not suffice there is no doubt that others will be established; but the artisans are not, unfortunately, so well supplied. For them there is nothing but apprenticeship, an institution condemned by moralists, political economists, and by manufacturers themselves. By the law of the 22nd February 1851 the master is only bound to teach his apprentice the practice of his trade; the latter has few opportunities of acquiring a knowledge of the applied sciences, which alone are the very foundation of industrial manufactures. It is true if the apprentice be less than 16 years old, and can neither read nor write, or has not completed his religious instruction, he can claim two hours a day to devote to school work; but the carelessness of parents, the idleness of the children, and the negligence of the masters have combined to render this part of the law a dead letter. Even the practice of their trades the apprentices do not properly acquire. In small industries the subdivision of labour causes them to learn only one branch; in large works they are placed under the care of a foreman or journeyman, who has no interest in teaching them properly.

It is not only in the primary or secondary schools that manual labour could be introduced. At Lille there is the example of a superior school to which the pupils from the colleges and lycées, sons of large manufacturers, come to be initiated in the difficulties of manual labour. So also at the Central School and the School of Arts and Trades young

men who are studying physics and chemistry must learn the manipulation.

The plan then proposed by the gentlemen who have established the journal "*L'Enseignement Professionnel*" is to form in the manufacturing towns mixed schools, where the children, at the same time that they are continuing their primary education, can, as soon as they are 12 or 13 years old, accustom themselves to the use of tools. They believe that the hours devoted to manual labour will serve as a relief to those employed merely in mental exercise. Again, parents who have to pay 150, 200, or even 250 francs premium to a master with an apprentice, will gladly keep the boy longer at a school where he is acquiring the practical knowledge which must shorten the years of apprenticeship and do away with the necessity for the premium. For children educated at the free schools whose parents are too poor to pay for an education at one of these schools evening classes should be multiplied where they can learn the theory of the facts which they have to apply in their daily work. For all such schools and classes no uniform organization can be laid down; only let them be independent of the university, and have within certain limits as great a freedom of action as can be allowed them.

Proposition
for establish-
ing mixed
schools.

In Paris the establishment of St. Nicolas, at Mulhouse the Jewish School of Arts and Trades, are examples of two different systems with the same object in view, namely, the improvement in the condition of the apprentice. At St. Nicolas 10 workshops have been opened under the direction of skilled workmen, to whom the pupils are bound apprentices, and who take upon themselves the expense of the workshop in return for the profitable employment of the children. The Brothers undertake their education and the charge of their board. In the Jewish school the apprentices go to their work during the day at the different workshops in the town, and when they return to the school in the evening receive lessons in French, ciphering, drawing, and geometry. Both at Paris and at Mulhouse the great object in view is the moral improvement of the pupils. These two schools are charitable institutions, and yet there is here, perhaps, the germ of a system which it may be well to develop. Attempts of the same sort have been made at Orléans, Nantes, &c. Many manufacturers have also given examples of what may be done for the education of apprentices, as M. Humbert at the spinning mill of Bresle at Gamaches. The majority of the manufacturers of Alsace maintain schools attached to their works; and the popular courses of lectures established by M. J. J. Bourcart at Guebwiller (Haut-Rhin)

Apprentice
schools.

are well known. As establishments more strictly technical, one may point to the weaving school at Mulhouse, the factory schools at Lyons, the courses of lectures lately organized by the Industrial Society of Amiens, and the older ones of the Industrial Society of Mulhouse. We have, therefore, specimens now in existence of every kind of establishment which can be provided for industrial education; we have the workshop in the school, the school in the workshop, the school outside the workshop. But we must hesitate before coming to any conclusion on the results which they have furnished. The establishments which already exist have had to experimentalize at their own risk, often with insufficient resources; they have had often to struggle against prejudice and opposition.

Intervention
of the State.

One great question remains to be answered—should there be any intervention on the part of the State? The reply is, Yes; but only in the character of auxiliary, not in that of originator. All pupils attending public courses of instruction should pay a small fee, to give them an interest in their work. Everywhere, where a good system of public instruction is maintained, this plan is adopted. At Mulhouse nothing is gratuitous; it is the same in all the Swiss cantons; at Paris the most frequented courses of drawing are those at the municipal schools, where a fee of from two to three francs is exacted monthly. In trade and apprentice schools the commune, the department, and the State should establish scholarships; this would be the most effectual means of encouraging these establishments, while aiding the pupils who cannot afford to pay.

Recommendations
of
Messrs. Gau-
mont and
Guémied.

The following, therefore, are the recommendations which MM. Gaumont and Guémied make for the organization of a general system of professional education:—

1. The Government should encourage the foundation of trade schools in the large towns, or come to the aid of those which are already in existence, leaving to the founders the power of choosing their own professors.
2. Both schools and pupils should be encouraged by the establishment of scholarships and half and quarter scholarships.
3. Every trade school which thus receives Government assistance should be opened in the evenings and on Sundays for public courses of lectures. Every manufacturer should have the right (always under supervision of the authorities) of lecturing them on subjects connected with his own special trade.

4. Inspectors from the office of the Minister of Agriculture, Commerce, and Public Works should be charged with consolidating the system of technical education, and should be required to give advice on the subject of scholarships.

In reply to the question whether the State should undertake the training of teachers for industrial schools, M. Gaumont is of opinion that in doing so it would encounter many difficulties. To give special instruction to workmen, it is of much, or even of more importance, that the teacher should possess a knowledge of the trade than of pure science. It is almost indispensable to have lived the life of the workshop in order to be able to elevate the mere handicraftsman from practice to theory.

Training of teachers.

Examination of Mdle. Hautier, Directress of the Municipal Drawing School for Girls in the Rue Notre-Dame-de-Lorette, Paris.

This school is one of nine established for a similar purpose in different parts of Paris, and receiving from the municipality annual grants varying from 3,000 to 3,500 francs. Mdle. Hautier complains that the grant is very insufficient, two of the other schools have obtained from the mairie of the arrondissement in which they are situated the loan of a building for which the sum of 300 francs is deducted from the grant by way of rent, but in her own school she has to pay 2,000 francs for rent, besides the salaries of two assistants, and for attendance, heating, and lighting, all which makes her annual expenditure amount to 4,000 francs. Altogether the school numbers 120 pupils, of whom 25 are admitted as free scholars in return for the municipal grant; the others pay a fee of two francs per month, producing a sum manifestly inadequate for the proper maintenance of the school and the payment of the teachers. Pupils are admitted at from 10 to 25 or even 28 years old; among the latter are governesses out of place or women who have been compelled to give up their profession on account of its not producing enough to enable them to live.

Female drawing schools in Paris.

The students of these drawing schools are in general daughters of parents of the middle class. Artizans have not yet sent their children because they do not see in what way to utilize their labours. A labouring man does not comprehend the advantages of an industrial trade for his daughter such as they are vaunted to him; and even admitting that she is admitted as a free scholar to the drawing school, where

Position of the students.

can she learn to paint on porcelain or some other art directly connected with an industry? On the contrary, renouncing all these problematical benefits which are offered to him, the father prefers for his daughter the trade of a seamstress, where her wages of one franc a day are of immediate benefit to the family. But unfortunately this trade, though sufficiently remunerative to the child, will only bring in to the woman a daily sum of 2 francs 50 cents. to provide for all the wants of existence, a sum which the introduction of machine work is continually rendering more precarious.

Obstacles to
the success of
the drawing
schools.

On the whole Madlle. Hautier finds that there are three great obstacles to the success of the schools of drawing.

1st. The instruction given at the schools itself leaves much to be desired.

2nd. Students who have made good progress have no opportunity of acquiring under a good master the industrial knowledge which enables them to turn their talents to account in a trade.

3rd. Even with those two difficulties overcome, there will remain a third even greater—where to find work?

Proposed
remedy.

To remedy these defects Mdle. Hautier proposes the establishment of a female trade school which should become a link between the drawing schools and the manufacturer. This institution should be not merely a school where girls would receive an apprenticeship in the industrial arts, but also a great workshop in which, under the direction of professors, they could execute works intrusted to them by the manufacturer.

The management of this establishment should be in the hands of a directress invested with absolute power to choose the professors and teachers and to direct what trades are to be learned in the school. Under her orders there should be an employé to conduct the business with the manufacturers. A board composed of artists and the professors should examine the drawings of candidates for admission to the school, and such an examination should take place once or twice a month. After having passed their elementary studies the pupils would be required to execute under the direction of the teachers the works sent to the schools by the manufacturers; the money realized by the execution of these works would be divided between the school and the pupils. When a student has acquired a certain amount of skill, and has finished her studies, she would receive a diploma which should be a recommendation in her favour with the manufacturers when she wishes to work on her own account. All the pupils should be day pupils, and the hours of the school

from 10 to 4. The school fee might be from 6 to 12 francs a month.

With a building sufficiently large to accommodate 500 students, and with a yearly grant from the State of 20,000 francs, Madlle. Hautier considers that such an institution must be perfectly successful. She is strongly opposed to teaching females linear drawing as she does not see to what industry women can apply it; she desires to introduce into her proposed trade school instruction in painting on porcelain and enamel, wood engraving, and engraving on metal, colouring prints, &c.

Evidence of Mdlle. Marchef-Girard, Principal of the Professional Establishment for young girls in the Rue-de-la-Perle, Paris.

At this institution 80 young girls, of whom about 65 attend regularly, are prepared for obtaining employment in commercial or industrial pursuits. This preparation is given in two divisions and a sewing school; in the first division the pupils are trained to become clerks and accountants; in the second they are taught drawing and design applied to manufactures. In the sewing school there are two workshops, one for dressmaking, the other for plain needlework; both are supported by the execution of orders received in the usual way, and are under the charge of a mistress and two fore-women.

Statistics and
course of
instruction.

The course of instruction extends over three years; the school is open at eight in summer and half-past eight in winter, and is closed at six o'clock in the evening in all seasons. Every morning the first two hours are devoted to general studies, comprising grammar, arithmetic, history, geography, and the elements of those sciences which may be of use to girls; the third hour is occupied twice a week in writing, twice in drawing, and twice in vocal music. Then comes breakfast, which as they are all day scholars, the girls bring with them, and for which an hour is allowed. At twelve or half-past twelve the pupils disperse to the different special studies, some to the commercial, some to the drawing, some to the sewing school.

The drawing school is under the direction of M. Lequien (senior), and great care is taken that the pupils shall be thoroughly prepared in general drawing. At the date of this evidence (January 1864) this branch of the institution had only been opened three months, and none of the pupils were sufficiently advanced to take up art specially applied to industry; it was however the full intention of the managing

Drawing
school.

body to open workshops for this object as soon as the progress of the pupils admitted of it. The special manufactures for which these workshops would be established would be those of fancy articles (*industries Parisiennes*) such as painting on ivory, ornamentation of hand screens, blinds, &c. Should a pupil wish to adopt any particular branch of industrial art not taught in the establishment she would be sent to a regular workshop, but without being permitted to break off her connexion with the institution. In reply to a question on the subject Mdle. Marchef is of opinion that learning linear drawing has a very beneficial effect on the education of girls, as it gives them habits of accuracy and precision in which they are generally said to be deficient.

Sewing school.

The sewing school is open from twelve to six o'clock; during the morning while the pupils are engaged in their general studies the mistress and her two assistants prepare and lay out the work. As it is indispensable that a woman should understand needlework, the greater part of the pupils in the commercial and industrial divisions of the institution pass two hours of every day in the sewing school at the express desire of their parents. Third year pupils undergo a course of instruction in cutting out. At present the amount of work executed in the sewing school is sufficient to render it self-supporting; in the last three months of 1863 the receipts were 662 francs, and the expenditure, including the salary of the mistress, 597 francs. The proceeds of the sewing school go to the institution until the pupils are skilful enough to be considered workwomen and to receive wages.

Commercial school.

The instruction given in the commercial division extends over two years; in the first are taught mental arithmetic and the calculation of interest, running accounts, and book-keeping by single entry; in the second year book-keeping by double entry, a knowledge of commercial law, and the English language.

Advisability of establishing similar schools in other parts of Paris.

Madlle. Marchef-Girard, being asked whether other institutions of the same description could succeed, replied that she had no doubt there was room in Paris for three or four such schools. At present the one in the Rue-de-la-Perle receives pupils from nearly all the arrondissements of Paris, notwithstanding the obstacle of the distance they have to come. She has also received from 50 to 60 demands for admission from the country which, as there is no boarding house annexed to her institution, she has been compelled to refuse. Considering only the material success of the establishments, she is of opinion that its conversion into a boarding school could not fail to benefit it, but the teachers would lose the influence which they now maintain over the families of the poorer

classes by the girls returning every day to their own homes. To evening schools for young women she is strongly averse, believing as she does that taking young girls from their homes at night affords a great opportunity for their contracting bad and immoral habits.

The institution under the direction of Mdlle. Marchef is maintained by a society composed exclusively of ladies under the title of "The Society for the Professional Instruction of Women" (*Société pour l'enseignement professionnel des femmes*), to which each member pays a fixed annual subscription of 25 francs, though many voluntarily raise this subscription to 50, 75, or even 100 francs. The pupils are the children of small tradespeople and clerks, and of the better class of artisans; they pay a fee of eight francs per month, a sum insufficient to meet the expenses of the school, but the deficiency is made up by the society.

Society for the professional instruction of women.

Evidence of M. Maignen, Member of the Order of St. Vincent-de-Paul, and Director of the Mission for the Succour of Apprentices (Œuvre de patronage des Apprentis) of the same Order.

This Mission forms a link between the parents and the masters in apprenticing lads to various trades. The boys have not been educated by the order, but are brought by the parents to the director of the Mission, who from his having been for 18 years occupied in the work is enabled to find masters for them. He first by examining a lad endeavours to draw from him his wishes and capabilities, though in selecting a trade he finds it a great drawback that he has not had a longer acquaintance with the candidate. The next step is to find a good master, and before making a final choice M. Maignen ascertains himself by personal investigation if the information which he has received on the respectability of the master and the moral prospects of the apprentice is correct. He inquires how the apprentice will be fed and lodged, and he regulates the length of the apprenticeship according to the nature of the trade to be learned. Before, however, concluding a final contract the boy is left for a fortnight with his master on trial, during which time the apprentice can see whether the trade pleases him, and if the regulations and life of the workshop suit him, while the master is on his side able to form an opinion of his new apprentice's abilities. It is only at the end of that time, and when these conditions are found to be satisfactory, that the lad is formally bound an apprentice but the Mission do not in any way become a party to the

Labours of the Mission.

contract. Every month each apprentice is visited in his workshop by the director, who inquires into his conduct and progress.

Influence of
the Mission
over the
apprentices.

The efforts of the Mission are directed entirely to the preservation of moral and religious discipline among the boys it has been instrumental in apprenticing. It possesses several houses maintained by a lottery, which is organized by the order, producing an annual sum of about 30,000 francs, and of one of these houses M. Maignen is the superior. Every Sunday this establishment is open for the meeting of the apprentices under the care of the Mission; here they attend the services of the Church, are regaled with a frugal dinner, and join in games and other recreations. Such is the success of this institution that it is found that out of 300 apprentices placed out by the Mission scarcely more than 25 are absent from these Sunday reunions, and the greater part of these 25 are only kept away by family duties. In addition to this the Mission have established a saving's bank (already possessing deposits to the amount of 30,000 francs) and evening schools for instructing the apprentices in reading and writing.

The law of
apprenticeship
a great ob-
stacle to the
successful
efforts of the
Mission.

In speaking of the general results of this scheme M. Maignen complains bitterly of the obstacles he meets with in the present condition of the law of apprenticeship. He says:—

“Our guardianship would be more efficacious if it was not for the immorality which prevails in the workshops. We had at the commencement to struggle against the cupidity of the masters and the bad spirit of the workmen. I have paid attention to the system of apprenticeship before and since the law of 1851. Before this law we were in a very bad state, the children were entirely victims of the workshop and the master. The law of 1851 has been a great benefit to apprenticeship, not so much perhaps as a direct lever as by the moral effect which it has produced. Unhappily this law is scarcely more than permissive; it does not provide for an official inspection, consequently it has hardly any other interpreters or supporters except the societies of patronage. However, if we appeal to the law we are listened to. At first, immediately after the promulgation of the law, we were better supported. M. Piétri, who was Prefect at that time, addressed a circular to the Commissioners of Police, and commanded them to watch over the execution of it. When we had any cause to complain on behalf of our apprentices of an infraction of the law we complained to the Commissioners of Police, who drew up a minute upon which we had justice done us. But the law of 1851 has for some years fallen into disuse; the Commissioners of Police no longer enforce its execution. We can only refer to the Councils of the Prud'hommes, but in our intercourse with them (which is rare) we have had proof that they neglect the

provisions of the law, and principally those relating to the moral condition of the children and their rest on the Sunday. The Councils of the Prud'hommes are rather lax on these points. Since the law of 1851 we have obtained a pretty considerable liberty of action from the masters of the workshops, we can now protect the morality of the children. We have, however, still to combat against the influence of the workshops themselves, an influence which is contrary to all authority, order, morality, and religion, and to which the greater part of our children would succumb if we did not use the most energetic means to protect them from it. We are also sometimes in opposition to the masters, but with them we have a more satisfactory result as I am connected at the present time with 500 or 600 workshops. I have a number of good masters of whom I am sure, only the master is not sure of the workman. When any unfortunate occurrence takes place the master is quite as grieved as we are, but he acknowledges his powerlessness, and says: 'I am obliged to suffer these things or shut up my workshop.'

Another difficulty that he meets with is that of selecting suitable trades for the children when they apply to be apprenticed. With regard to this he says:—

Difficulty in choosing proper trades for the apprentices.

"We are in total ignorance as to the value of the different trades. The parents come to us to ask us to place their children; we *do* place them, but blindfold, for we do not know whether the business that we have chosen for them is not overstocked with workmen, and whether when we have placed the child we have not still further augmented the miseries of an industry already overburdened with labour. This is a very serious question for us; our ignorance and the ignorance of the parents upon this subject often makes us put children into a business which is in fashion, but which does not know what to do with its workmen, whilst other trades very little known are in peril for want of hands without our being aware of it. I have seen masters of trades not much known come to us for apprentices to save their workshops from being at a standstill for want of hands. The parents bring their children to us and say: 'Place our children as well as possible.' Provided their children are lodged and fed they neither trouble themselves as to their capabilities nor as to their choice of a profession, they leave to us the care of choosing a business according to the talent we are able to discover in each child. Would it not be possible to have statistics which would help us in placing the children in the best trades and those in want of hands?"

With regard to school workshops M. Maignen does not think that they are productive of benefit. An apprentice can only become a good workman by seeing others at work, and by learning the large processes of manufacture. It is in the motion and life of a large undertaking that the intelligence and ability of a young man develops itself, that he com-

School workshops.

prehends the value of a particular material, that he learns the manner in which and the conditions under which it can be best worked. On the contrary, the young man in a small school workshop is at no pains to be industrious and never acquires any great degree of skill.

The house of
rescue of the
Abbé Halluin
at Arras.

At Arras, under the direction of the Abbé Halluin, and by the same Mission of St. Vincent-de-Paul, an orphanage for 200 apprentices has been established. In this house the apprentices at work during the day in different workshops of the town receive board and lodging. The proceeds of their labour go towards defraying the expenses of their maintenance, and the rest is made up by voluntary contributions and by grants from the commune and the department. It is in fact a charitable institution; the inmates have regular hours for meals and for sleep as in a boarding school; in other words it is an asylum for apprentices.

Measures
proposed by
M. Maignen
for improving
the condition
of apprentices.

In conclusion, M. Maignen suggests one or two measures for the improvement of the condition of apprenticeship. He says,—

“I must give utterance to my wish that the excellent institution of giving prizes for apprenticeship in the schools should be extended. This is an admirable institution, that you doubtless know; it consists in a competition established between all the schools, and the city of Paris grants 250 francs to those children who have obtained the first places. It is a great encouragement to teaching in the schools. Unhappily the instruction given in the schools is very deficient; there are eight or ten children who are advanced, the others are neglected. What happens? When the children show any talents their parents, through ambition, will not make workmen of them; they urge them to employment in offices or in commerce, so that there are hardly any children in the workshops but those who know, so to say, nothing. The prizes of apprenticeships are then a very great motive for instruction in schools, and if they could be multiplied it would be a great boon.

“There is another means of encouragement for apprentices; it is exhibitions of their works, followed by rewards. There is much to be said regarding apprentices in workshops. In general the professional instruction of apprentices is very much restricted, is indeed almost null. An apprentice in a workshop is a kind of errand boy; he looks at the others work, and that is all. The name by which an apprentice is called in workshops is that of knowledge catcher (*attrape science*), and it is true; he must catch it, no one shows it him.

“The perfection of the processes of fabrication of mechanical means, make trades disappear, therefore there are hardly any individual trades; there are only *filers*, *piercers*, *turners*. The apprentice is surrounded by workmen who scarcely know their trade. In a word, the artizan is disappearing, the handicraftsman no longer exists; he is replaced by those trades which do every-

thing. For example, the embosser will emboss for the manufacturer of brass ornaments, as well as for the silversmith, and the latter will only have solderers in his workshop to fit the pieces already made. What can a child learn in such workshops as these?

"I have one more improvement to propose, and it is the last: it is to endeavour to help the workmen to keep their children at home during their apprenticeship. I assure you that one of the causes of the decay of work and of the small number of true workmen, is the growing immorality of the workshops. The moral workman is generally clever. That which is true of the grown man is still more so of the child. That which most usually ruins the apprentice is his living at the workshop far from his family.

"Keeping an apprentice at home is almost an infallible means of making him well conducted. But poverty is often the great obstacle which prevents parents from feeding and lodging their children. There is hardly any remedy to this evil, unless it is an ancient institution which formerly existed in the *bureau de bienfaisance*, and which was called *pain d'apprentissage*. Bread was granted to parents to help them to support their children. I repeat, it is greatly to be desired that this institution should be revived. The decay of manual labour has no other cause than the immorality of the workshop. The parents will take care of the morality of the child and of the young man, as well as of his future."

Evidence of M. De Commines de Marsilly, President, and of M. S. Ferguson (junior), Vice-President of the Industrial Society of Amiens.

This society was established in December 1861 by the exertions of 14 or 15 individuals, with the object of diffusing information among the industrial classes, and particularly that kind of information which bears upon the different industries of the district. It contains now (1864) 300 members, and enjoys a revenue of from 16,000 to 18,000 francs, raised entirely by voluntary subscription. With these resources it is evident that the society could not maintain a regular technical school; the utmost they could hope to effect was to establish public courses of lectures brought within the reach of all.

Objects of
the society.

Since the manufacture of cotton, woollen, linen, and mixed fabrics, and of hosiery, is the staple industry of the department of which Amiens is the chief town, the first course to be established was one in spinning and weaving, and accordingly an appeal for assistance was made to the manufacturers of the district most likely to be benefited by the instruction given to the working classes. The success of this appeal was such that in the short space of a twelvemonth, without the aid of a single centime from the State, the society opened

Establishment
of courses of
instruction in
the industries
of the district.

its first course for practical instruction in spinning and weaving with a material of the value of nearly 30,000 francs; this material consists of a steam engine of four-horse power and a number of power and hand looms of the most approved and newest construction. These looms were many of them constructed and fitted by mechanics and foremen who gave up a portion of their overtime, some even without accepting payment, for the purpose. By this means the professor of the course does not teach by aid of models, but actually sets his pupils at work on the machines themselves such as are used in the manufacture of the different fabrics. A great advantage which it is hoped will be derived from this course, is the introduction into the manufactures of the district of the more extensive use of steam power, which, especially in the cotton-velvet industry, has been opposed not only by the operatives but even by the manufacturers themselves.

Dyeing forms another industry of great importance in the Department of the Somme, but it is found that many of the workmen and even of the foremen were ignorant of the principles on which their manufacture rests; they know by heart the receipts, the quantities, the processes which they are in the habit of employing, but they can give no cause and find no remedy when the shades of colour are not exact, or when the tints are not perfect. To establish a course of chemistry applied to dyeing was therefore the next step in the path of the society. For this purpose the same means were adopted as in the former case; an appeal was made to the chemists, the dyers, and the dye-stuff merchants, and in less than a month the society was able to establish a very complete laboratory. The course opened in this institution is attended by above 100 students, among whom are many foremen and operatives.

Professors
and teachers.

The professor of the course of spinning and weaving is M. E. Gand, Member of the Academy of Amiens, and one of the original founders of the society. He has also been manager of the society, and receives, in addition to a house, fire, and lighting, a salary of 2,000 francs; besides which he is at liberty to follow his profession of industrial designer and reader of cards for the Jacquard loom. The course of dyeing is under the charge of M. Poiré, a member of the society, and professor at the university. There is also a course of mechanics and mechanism professed by M. Banderali, who gives one lecture a week, but it is less numerously attended than the other two courses. It is also proposed to give a course of instruction in industrial drawing. Many of the pupils when they leave the commercial schools can copy drawings either linear or free-hand, but they know nothing

of drawing applied to industry. The object of this course will be to teach the pupils as they leave the commercial schools the laws of composition and of colour, and when they are intended to enter any particular branch of manufacture to teach them the drawing applicable to that manufacture.

For the benefit of persons engaged in commerce the society has established a class in the English language under the care of M. Leullier. As the commercial relations of this district with England are very extensive this class has been for some time attended by no less than 150 students. The lessons are given twice a week and are quite free. Another member of the society, M. Vion, headmaster at Amiens, has opened a class in German on the same terms as that in English, but it is less numerously attended, as the former language is not of such use to the merchants of Amiens as the latter.

Modern
languages.

As a complement to this system of industrial instruction, there is a project on foot to found an industrial museum. The society possesses in the premises which it now rents a large hall which it is proposed to devote to this object. It is first intended to appeal to all the manufacturers of the district for specimens of all the products of the department. It is desired to obtain if not the masterpieces of ancient and modern art themselves, at least copies of them, and for this object the society hopes to obtain the aid of the town and of the State.

Technological
museum.

Another purpose of the society is the training of skilled and intelligent foremen. At present it is difficult to find competent foremen, and manufacturers are compelled to bring them from Rouen, Armentières, or England; more often from the latter country. The society therefore proposes to select the most capable from among the operatives and train them to become efficient foremen, so that when a manufacturer stands in need of one he has merely to apply to the society, who will give him ample information on the ability and character of men on whom he can rely.

Training
foremen.

There is, again, a project on the part of the society of establishing an apprentice-workshop. The intention is to obtain extensive premises which, as soon as the funds of the society permit, will be fitted with all the appliances both for power and hand weaving. They will then say to the youths: "We are going to give you the opportunity of learning your trade of weaver in a space of five or six months; during this time we will give you 1 franc 25 cents. a day, the same wages as all apprentices get in Amiens. When you leave us to enter a factory we will keep back from your wages the excess above 1 franc 25 cents. If, for example, you

Apprentice=
workshops.

“get 2 francs 25 cents., we shall keep back 1 franc until the society has been reimbursed the expenses it has been put to for you.” At present however this is only a project in idea.

Advantages of instruction in actual manufacture over that in applied science.

In choosing between scientific and technological courses as methods of instruction, that is, between courses of lectures on chemistry, physics, and mechanics applied to manufacture, and special courses in actual dyeing, spinning, and weaving, M. de Marsilly prefers the latter. He maintains that it is necessary to go at once to the heart of an industry; a student must receive practical lessons in what he practises or ought to practise every day. Thus the attention of the artizan is actively aroused; he is convinced of the utility of what he is learning, and does his best to understand it. He is often stopped, no doubt, by his want of elementary knowledge, but the teacher can supply that by mingling skilfully with his practical instruction information on general subjects. Thus in teaching practical dyeing the professor can recall to his audience or can inculcate such elementary portions of chemistry as may be required; the professor of mechanism in describing steam engines can establish certain general principles of mechanics and physics in the minds of his hearers. Technological instruction is the only one which is adapted to great industrial centres, the only one which is likely to be appreciated and to produce good results; therefore it ought to alter its character and adapt itself to the special industries of the locality where it is given.

Influence of the manufacturers over their work-people.

To encourage elementary as a preparation for technical education, M. Ferguson would look to the large manufacturers. It is indispensable that all workpeople should be able to read and write, and he believes that the manufacturers can further immensely the action of the Government. One of the means they could employ would be to establish schools in their factories, and compel all their operatives to attend them; another would be to give certain advantages to those artizans who can read and write. For example, some chiefs of industrial establishments provide for their work-people when they are sick medical advice and medicines; others again have founded bakeries and furnish them with cheap bread. If then all manufacturers were to form analogous institutions they could deprive of the advantages of them such of their workpeople as refused to learn to read or write.

Opinion of Messrs. De Marsilly and Ferguson on the means of extending

In reply to the question as to what should be done to extend technical education in France, these gentlemen made the following statement:—

“According to our views the aim of industrial education is to enable each member of the working classes to obtain the special

technical knowledge which affects his own industry. We think that such industrial teaching, well understood, well practised, and generalized, may, with the commercial regime that the Government has recently inaugurated, contribute most powerfully to develop industry and cause the country rapidly to rise to a high degree of prosperity. But in what way should this industrial instruction be received? How should it be practised? How make it penetrate to the masses? These are the questions that we have to examine. technical education.

“ To solve them it appears to us necessary first to see to what classes this instruction is addressed. For this purpose we divide the industrial classes into four principal categories. The first contains the young men belonging to families in easy circumstances; the second comprehends the youths who are obliged to go to work or into business at the age of 15 years; the third comprises the foremen and the individuals who have received a good elementary education; the fourth consists of the operatives proper.

“ Let us examine what there is to be done for the first, those in easy circumstances. These young men have the Central School, and the Schools of Application open to them. We think that under the existing state of things they have in these all that is required. We may even add that it does not appear to us desirable, as regards industry, that too many young men should seek this superior education, which sometimes places them in a difficult situation, diverts their thoughts from commerce and industry, and makes them aspire to places similar to those found under Government. The most important qualification for industry is self-reliance; it is that which contributes especially to the prosperity of a country.

“ There are two means of giving the necessary technical knowledge to young men in the second class who have only received superior preparatory instruction. The first consists in creating professional schools in industrial centres of any importance; the second in opening courses of instructions, such as we have already described. There are the Schools of Arts and Trades, which suit a certain number of young men and which render great services; but they are insufficient because they are not numerous enough, or rather because they are only adapted to two or three specialties—mechanism, for instance.

“ All the schools should not follow the same programme; that particular trade practised in the locality should be taught in each of them. Thus, at Amiens the instruction should be on all that relates to dyeing, spinning, and weaving, and at Limoges on all that which would be useful in the making of porcelain. This is a first principle with us: we assume that in the professional schools no instruction shall be given but that which bears on the industry of the locality. We also assume that the young men shall not be admitted without having received a superior preparatory education, and that to enter they must undergo examination. We also think that these schools should not take boarders, only day scholars. We are of opinion that the instructors should be appointed by the Government, and the communes ought to support the schools. Private manufacturers, with very few exceptions, do not appear to us able to establish them.

"The second and perhaps the most powerful means of instruction consists in the creation of public and gratuitous industrial classes, because they are adapted to a larger number of persons. We need not enlarge upon the nature of these courses; we will only repeat what what has been said in speaking of our proceedings at Amiens. These classes sufficiently meet the wants of a numerous class of young men whose families will not be separated from them, who desire to continue their father's business, or who are employed in houses of commerce or large manufactures. They can there at the end of their day's work obtain the information which is necessary to them; they have sufficient elementary knowledge to follow the classes with profit, as we presume that they have already received a tolerably high preparatory instruction.

"We arrive at the third category, that of the foremen; a class of men which renders the most eminent services, and among whom it is, above all, desirable to diffuse the greatest possible amount of knowledge, because it is upon that knowledge that all the labour of the workshop depends. These foremen are occupied all day; they therefore require industrial courses of lectures at night, adapted to their requirements, as we have proposed for the second category. It is the only means of augmenting their instruction.

"After them come the artizans. Artizans show a great desire for instruction. Every time the classes have been opened we have noticed that they attend them with much interest and assiduity. In consequence, we think that evening classes might be advantageously established for them, and that they would be well attended. But here we meet with a very great difficulty, that which proceeds from ignorance, which brings us to the question of preparatory instruction. Many of the artizans neither know how to read or write. This is a sad fact, which we often meet with at Amiens. For this reason they cannot follow a course of lectures with profit, for how are they to take notes? Last year the Industrial Society opened a competition for stokers, to which it invited all the stokers of the Department. The point in question was to heat a boiler as economically as possible, or, in other terms, to produce in the same space of time the greatest amount of steam with a given quantity of coals. Thirty-two stokers presented themselves. We made them undergo a few preliminary trials, which set aside those who were quite incapable. Amongst these trials there was an exercise of reading and writing; out of the 32 competitors only seven knew how to do either. Nevertheless the stokers form a tolerably intelligent class of workmen; they are not simple labourers; they are not chosen from the first who offer themselves. On the other hand, those who presented themselves were certainly not the worst, for to have done so they must have felt that they possessed a certain amount of capacity. Seven out of 32 in a department which is certainly not the least enlightened of France; this is the proportion.

"In Germany preparatory instruction is compulsory. The results of this are excellent. We have often seen very intelligent work-

men in Germany, and we have heard chiefs of workshops who had occasion to employ simultaneously both French, Belgians, and German workmen, declare that after a certain time they recognized great superiority in the Germans, who were better instructed. Must we endeavour to render elementary instruction compulsory? This is a question we put without pretending to solve it here. That which we state with grief is the very great ignorance and often the complete absence of elementary instruction amongst workmen. It is then expedient, on the one hand, that the Government should do all that lays in its power to diffuse elementary instruction as much as possible, and on the other hand that manufacturers and philanthropists should make the strongest efforts to enable the workmen to take advantage of it. Consequently, we think that, besides the courses of lectures, it would be very expedient to have evening classes for the elementary instruction of artizans. There are already several of these classes at Amiens. We hope to open some ourselves. We cannot certainly do everything at once, but it is a question on which our attention is very seriously fixed.

“A measure which we also think is well calculated to diffuse preparatory instruction amongst artizans consists in creating apprentice societies (*œuvre des apprentis*), the aim of which is to establish a kind of patronage for young workmen, to assist them in their apprenticeship, and to induce them to give up two or three hours every day to study.

“Such are the measures which appear to us best adapted to diffuse a knowledge of technical science among the different classes which compose the great industrial family. The ways and means still remain to be considered, and on this very important point we venture to make a few remarks. We think that professional schools ought to be instituted by the State; it alone can ensure that regularity and order necessary to their stability. But it appears to us very important that Government, in creating these schools, either alone or with the aid of the communes, should seek the support of the manufacturers of the country in the following manner:—By instituting for each of these schools a Council of Improvement (*Conseil de Perfectionnement*), or Superior Council, which should watch over the studies and should be consulted, not only respecting the programmes, but also on the choice of the teachers. We are convinced that by this means Government would everywhere find the most effectual co-operation; it would interest the towns and the men of the various localities in the success of these schools, and it would receive from them most useful information upon all those subjects connected with the local industries. It is quite otherwise in regard to the courses of lectures on technical subjects. We think that here it is the interest of the Government to interfere as little as possible.

“In all these matters it were better that Government should not interfere at all. Though we have asked for its direct intervention just now in the creation of professional schools, it was because we thought it indispensable; but if we could do without it, it appears to us that it would be preferable. The courses of lectures would

succeed as a private enterprise. We ask that Government should only intervene by encouragement and grants, if necessary. Respecting what we are doing at Amiens, for instance, we think that the intervention of Government ought to be limited to moral support; we only ask the continuation of what has been done for us up to now by the Prefect of the Somme. If at any time our resources become insufficient, then alone we would apply to Government for a grant, but we wish to act as much as possible on our own resources, and we think that it is the best plan.

"In all cases we think that Government should stimulate private and local enterprise. Where no industrial society exists it might apply to the Chambers of Commerce, and ask them to point out what courses of lectures they thought it would be best to establish. It might put a certain sum at their disposal for this purpose, and thus induce them to establish these courses. But in such a case we assume that the Government will confine itself to granting pecuniary aid, and to exercising a general supervision; all initiative it will leave to the Chambers of Commerce and the manufacturers of the place. The professors, for instance, ought to be chosen by the Chambers of Commerce. There is another motive for proceeding thus, besides that of interesting the men of the place in the success of a local work of importance. By giving a grant the Government can very well call upon the Chambers of Commerce and the manufacturers to share in the work; it can easily say to them: We wish to see industrial classes established in your town; we are disposed to pay the teachers, but you must procure us the premises and the necessary material, or at least a part of it. On all accounts we attach great importance to the development of local and private action under an appeal from the Government."

Evidence of M. Lequien (senior), Director of the Communal School of Drawing in the Rue Ménilmontant, Paris.

Communal
schools for
drawing in
Paris.

There are at the present day seven communal drawing schools maintained by grants from the Municipality of Paris. They are intended entirely for the benefit of the artisans who pursue trades depending on the arts of drawing and sculpture, as the trades of the upholsterer, the paper stainer, the porcelain manufacturer, the bronze worker, the jeweller, the goldsmith, the engraver, the designer of tapestry and carpets, the sculptor, and the decorator. Hitherto the grants to these schools have been inconsiderable; there is no general organization regulating the nature of the instruction and the method of giving it, but every teacher has pursued his own course on his own responsibility. It is true the teacher has been actuated by conscientious motives, but he is under no control; the consequence is that the future of each school is dependent on the circumstances which affect its director. Notwithstanding, however, that these schools of drawing are

thus abandoned to themselves, they can claim to be the cause of nearly all the progress which has been accomplished in the manufactures above enumerated.

The aid granted to the school of which M. Lequien is the director consists of an annual grant of 3,000 francs, with the cost of lighting. The number of students registered on the books is on an average 200, but these do not attend at all regularly. It cannot be reckoned that any one student attends the school more than six months in the year. The age of the students varies from 12 to 30 years; taking the mean it may be called 16 years. They pay a monthly fee of 3 francs. Students presenting themselves with a certificate from the mayor of their arrondissement or from a charitable society (*bureau de bienfaisance*), or even with a recommendation from one of the apprentice societies (*sociétés de patronage*), receive a free admission, but it must be confessed that these free students are among the least industrious attendants at the school. Since the year (1835) of the opening of the school to the year 1853, 7,000 pupils have passed through it, giving an average of 250 attendants for every year.

Statistics of
the school in
the Rue
Ménilmontant.

It is an object with M. Lequien to render the instruction in drawing in his school as general as possible under its two great divisions, that of the figure and of ornament. As there are many specialities in manufacture, so each pupil wishes to learn some special branch of drawing or some peculiar style, but it is found that a general course of instruction renders the workman capable of pursuing any branch of his art. But though the instruction is general in principle that does not prevent the pupils from studying the portions of the subject bearing more directly on the manufacture at which he works: studies which, however important in other respects, are completely out of the way of the object which he wishes to attain are not forced upon him. Besides it is necessary to give way in some degree to the expressed wish of parents or masters when they themselves present their children or their apprentices at the school.

Course of
instruction
very general.

A special studio for modelling has been established.

In reply to a question M. Lequien advocates strongly the introduction of linear and architectural drawing into these schools. On this point he says:—

Views of M.
Lequien on
teaching linear
drawing.

“I believe instruction in these subjects to be indispensable to all engaged in the manufacture of furniture. Cabinet making, particularly would derive great benefit, both as regards the proportions, elegance, and purity of form, as well as regards the harmony of the mouldings, which are often disproportionate or of different styles. A piece of furniture, no matter what it may be, whether a cabinet, sideboard, bed, or console, is nothing but an

edifice applied to a useful purpose ; architectural design should rule the whole as well as the details, and it is from the judicious combinations of these elements arranged with a view to its use that it derives its merit. Furniture destined for repose ought to be of simple construction ; the ornaments with which it is often overloaded appear to be made rather to hide the clumsiness of its form than to embellish it. Ought not the furniture of a room to agree both in shape and colour with the architecture. It is a whole, each part of which should be in harmony. In this last part of the work the architect is often replaced by the paper-hanger, who having no architectural or decorative knowledge allows himself to be guided by the extravagant caprices of fashion or by a traditional routine. Again, bronzes, lustres, candelabras, cups, and the basement of a clock may all be considered in relation to their architectural fitness. Ceramic art borrows its first and principal value from form. No matter how great the merit of the paintings which ornament porcelain, it is the proportion and the elegance of the shape which ought to be the first consideration. In monumental art, statuary itself is subordinate in its proportions and its effect to the laws of the science of lines which ought to prevail in every manufacture."

Linear drawing to be taught to girls.

M. Lequien also recommends the adoption of elementary linear drawing as a subject of instruction in the education of girls ; provided that it does not go further than the description and definition of the principal geometrical figures. He asks, Why should a woman not know what is an angle, its relative value, and the means of discovering it by means of the protractor ? Why should she be ignorant of the use of the compass and the square ? Why should she not be able to describe a circle and to measure the number of degrees in its circumference ?

Theoretical study applied to industrial art.

According to M. Lequien a great decline has taken place in the theoretical studies bearing on the industrial arts since the year 1848. There are several causes for this decline, but the most important is the modern condition of apprenticeship. On this point he enlarges at some length, and points out the dangers to which an apprentice is nowadays exposed in the workshop. Where one or two apprentices are quite enough to have in the shop to be able to teach them their trade properly, it is now not at all unusual to see 10 ; they are instructed in a few months in one of the divisions into which their trade is subdivided, and in less than a year are in a position to earn wages of one or even two francs a day. This branch of the trade they carry on for two years or sometimes for more, and when the limit of their indentures approaches they are made to undertake some more important work which they do not understand for want of being prepared for it. The hours which they pass in the workshop from 6 o'clock in the morning to 8 o'clock at night, and

which are often extended to 9 and even 10 at night in the hope of gaining a few extra sous, preclude them entirely from attending any school for apprentices. It may be affirmed that the more an apprentice earns the less he learns.

In consequence of this defect, as well as the immoral tone of the workshops, M. Lequien considers that parents of the middle class hesitate now before apprenticing their children to an industrial trade. At the expense of even privation and suffering they will make sacrifices to keep the children longer at school, and as soon as possible obtain employment for them in houses of business or the offices of the large companies. Thus it comes to pass that the industrial arts are forsaken by the very social class which could benefit by them, whose progress and morality they would promote.

Evidence of M. Bernot, Director of the School of Industrial Arts and Mines at Lille.

This school, established in the year 1855 under the title of the Professional School (*Ecole professionnelle*) of Lisle, was at first anything but a success, and struggled on against adverse circumstances until the year 1860, when under new management, a change of programme, and an altered title it made a more successful appeal for public support. Founded at first as an institution for the training of foremen and skilled workmen, it had to compete with the Superior Primary School (*Ecole primaire supérieure*) of the town, an institution where an education of a more general character was successfully given, besides which it received no pecuniary assistance either from the town or the department. In its present form the pupils of the school are the sons of manufacturers, who pay as boarders the annual sum of 1,000 francs, and the municipal council further aids the school by the establishment of scholarships.

Varying success of the school.

The school is open to young men who after having passed through the classes of the lycées and similar institutions, wish to receive special instruction in one of the following industries:—1st, the construction of machines; 2nd, weaving and spinning; 3rd, applied and agricultural chemistry; 4th, mining. The studies are analogous to those of the Schools of Arts and Trades, and of the Central School, but while it is more practical than that in the latter, it is at the same time more special in its applications, more limited as regards the time devoted to manual labour than in the Schools of Arts and Trades. Every day the pupils pass from two to three hours in the workshops for forging, founding, fitting, joining, and modelling, at the looms or in the laboratory, and as often as possible

Objects of the school.

they are taken by the professors to visit the larger manufactories of the district. The duration of the course of study is two years, followed by a complementary year for those who take the course of mining, or who wish to obtain a more complete knowledge of construction. A diploma certifying ability in one of the special subjects of instruction in the school is given after examination before a board.

Conditions of admission.

To be admitted to the industrial courses it is required that the candidate should be 16 years old, and should pass an examination in the subjects of examination for the bachelorship of science, but for graduates this examination is dispensed with. The terms for a boarder are 1,000 francs, for a half-boarder 750 francs, and for a day pupil 500 francs. Out of doors the pupils wear a uniform and a special dress in the workshop. The school also takes day scholars, paying only 100 francs a year, and receiving instruction to fit them for foremen, which consists of machine drawing and mechanism, demonstrations in the laboratory, and working in the shops. An evening course of weekly gratuitous lectures for stokers has been established, and the possibility of giving practical courses to workmen is under consideration.

Course of instruction.

In the first year the students are instructed in physics and chemistry with their applications to manufactures, algebra, descriptive geometry, analytical geometry, and a little of the differential calculus, with its application to mechanics. Drawing is taught after the method adopted in the Schools of Arts and Trades; in every case a free-hand sketch in a book precedes the working drawing. The course of machine drawing proceeds regularly from preparatory exercises to parts of machines, and finally to finished drawings of the machine itself; the pupils prepare both drawings of machines, of which the data are given in the course on mechanism, as well as working drawings from sketches made in the workshop of machines erected there or under repair. The general principles of mechanics are studied as preparation to the course of mechanism and the construction of machines.

In the second year the pupils while studying in common commercial accounts, the management of factories and industrial economy, applied physics and chemistry, the sanitary arrangement and architectural construction of workshops, are divided into sections for the special subjects. In the first division are taught the construction of machines, with the means of supplying materials and learning their nature and commercial value, the method of working them up, and of forming rough estimates of their cost. The pupils of the second division study, not only the working of textile fabrics, but also the industrial and commercial organization of weaving

and spinning workshops, both as regards working staff and materials. In the chemical division instruction is given in the industries of bleaching and dyeing, in the manufacture of chemical products, beer, oils, manures, sugar, alcohols, alkalies, gas, and their derived products. The mining division includes pupils in geology and mineralogy. The complementary studies of the third year comprehend the working of mines, metallurgy, and stereotomy, and an extra course in the fitting of machines.

The training given in the workshops is intended to accustom the pupils to the working of machines and looms, to give them manual skill, a practical acquaintance with the processes of execution, a knowledge of the difficulties which the raw material opposes to mechanical action, and finally to fit them specially for undertaking the charge of workshops and the direction of workmen. By this means the works executed excite their emulation and the action of the machines becomes familiar to them, the whole forming a technical and experimental system of instruction which could be replaced by no other. Manual labour.

The school numbers now nearly 60 pupils, for whose instruction there are employed a head professor, three assistant professors, an usher, and a director of the workshops. When the school was established on a new basis the aid received from the town and department amounted to 10,000 francs, this sum has decreased in successive years to 8,445, 8,164, and 5,521 francs, and will still continue to diminish as the school develops its resources. The works executed in the workshops are farmed by a contractor; the advantage of this plan is that it enables the director to supply his pupils with a great variety of works without having to draw specially on the funds of the establishment. Thus in two years the pupils of the school have repaired and altered 12 spinning frames, constructed boring apparatus, and forged mining tools; repaired two steam engines, made 100 centrifugal and common pumps, executed numerous works in joining and modelling, and completed distilling and sugar apparatus. Statistics of the school.

In reply to the question as to what are the wants, and what should be done to meet them, of industrial education in the Department du Nord, M. Bernot divides the constituency whose case is to be taken into consideration into three categories; 1, the workmen; 2, the foremen; 3, the large manufacturers. In the first case he is of opinion that the great obstacle to the development of technical training lies in the want of elementary instruction; with this instruction properly extended, supplemented by the teaching of industrial drawing, Views of M. Bernot on technical education in the Department du Nord.

artizans would be quite in a position to appreciate the value of the practical education they receive in the manufactory. To give increased facilities for acquiring a knowledge of drawing, M. Bernot would found apprentice schools and establish evening classes. With regard to the foremen it would appear that the teaching hitherto offered to them has been of two abstruse and scientific a character, a defect which might be remedied by the establishment of night classes and the appointment as teachers of persons selected from among the employés of the great manufacturing houses, who would inspire confidence in their pupils as being of the same class as themselves. As respects the manufacturer, M. Bernot considers that in the Department du Nord, he has been too long a mere merchant, without sufficient scientific knowledge to recognize and apply new discoveries to his industry. This defect is just the one which the School of Arts and Mines at Lille has been established to meet.

Recommendations for the extension of technical education.

In conclusion M. Bernot makes the following recommendations:—1st, the foundation of an institution on a large scale for the special instruction of all engaged in industrial manufactures in the Department du Nord, and maintained by grants from the State, the town, and the department; 2nd, municipal courses of lectures in every town to complete the education of foremen according to the special industry of the locality; 3rd, the formation of night classes in still greater numbers where the elementary instruction which is so much needed by the operatives is supplemented by the teaching of industrial drawing.

Evidence of M. Noyon, Director of the Municipal Affairs of the City of Paris.

Action of the municipality of the city of Paris.

The city of Paris maintains 110 primary boys' schools, 109 girls' schools, 48 classes for male adults, and 19 classes for female adults; these schools and classes are entirely free. It aids besides 10 private schools for boys and seven for girls, and seven male and eight female schools of drawing. It also possesses the Chaptal College, the Turgot School, and the female school in the Passage St. Pierre; these are institutions for secondary instruction.

Primary and drawing schools.

In the primary schools the principal subjects taught are reading, writing, spelling, and arithmetic, and in addition, in the first class, the elements of French history, and of geography, singing, and (in the boys' schools) drawing. The latter subject is not taught in the girls' schools. The adult schools or evening classes are conducted in the rooms of the primary schools. Parallel with these adult schools there

have been established 15 special schools of drawing, seven for men and eight for women, and comprising the Imperial School in the Rue de l'École-de-Médecine; of these the men's schools have been several years in existence, but the women's schools have only been founded within the last few years. Projects are entertained of increasing the number of all these schools. The Prefect of the Seine intends to establish both a male and a female school of drawing in every arrondissement of Paris. It is also proposed to found two new Turgot schools, and another Chaptal college. The total cost to the city of Paris for the maintenance and aid of all these schools and classes amounts to five millions and a half of francs. In the primary communal schools there are under instruction 29,629 boys and 24,931 girls, and in the adult classes 7,100 men and 1,500 women. The drawing schools which are aided by the city have inscribed on their registers 1,607 boys and 427 girls, with an average attendance in each case of 907 and 200. The Imperial drawing school (*École Impériale de Dessin*), which adopts a special system of instruction, is included in these numbers; in this school drawing is taught in all its degrees, from linear drawing up to drawing from the cast, and art drawing. A course of construction, of course not so extended as that professed at the School of Bridges and Roads (*École des Ponts et Chaussées*) and the Fine Art School (*École des Beaux Arts*); a course of architecture and another of chemistry are also taken here. Drawing is not only taught in all its applications to the industrial arts, but designs are also made for bronzes and furniture, thus giving the school a truly professional character.

There is no regular apprentice school maintained by the city, but it has made advances in that direction by the establishment of exhibitions for apprentices, and has placed on its estimates the sum of 81,475 francs for several years with this view. In this way the municipality aids annually in the apprenticing of about 900 children on their leaving the primary schools. Every year a board, presided over by the mayor or his deputy, and composed of the curé of the parish, a minister not of the Roman Catholic communion, a member of the committee of the canton, an inspector of primary schools of the arrondissement, and a lady inspector of girls' schools, makes a list of six candidates for every hundred children in the school upon information furnished by the master or the mistress, and after a preliminary inquiry as to the condition of the parents. To be admitted to this list the children must belong to poor parents, who engage that that they shall learn some manual trade, and who are them-

selves distinguished for their industry and good conduct. The children must, besides, have attended the communal schools for at least two years; they must have been confirmed, or be more than 12 and less than 14 years old. When thus admitted to the list they have to undergo an examination before the board in their respective schools in those subjects which are compulsory in primary education. The results of the inquiry into each case, the lists of the candidates, and the notes of the examination are submitted to the Municipal Council, who propose for the selection of the Prefect two candidates at least for each exhibition, and he nominates the exhibitioners. When the nominations are settled, the municipal bodies put themselves into communication with the masters, and the respective obligations of the masters and of the parents or guardians are fixed by indenture. The mayor of the arrondissement is also a party to the indenture, and is able often to obtain wages for the apprentice. In this case the exhibition or the sum left out of it is deposited in the savings bank for the benefit of the apprentice. But he is not lost sight of by the authorities; at the expiration of his apprenticeship the committee of the canton gives information as to his conduct, and according to their report the sum deposited in the savings bank is handed over to the apprentice when he is of age, or restored to the municipal treasury.

Opinion of M. Noyon on the extension and development of technical instruction.

In reply to a question demanding his opinion as to what should be done to extend and develop professional instruction, M. Noyon considers that the schools of the character of those of arts and trades at Aix and Châlons should be multiplied, and that important towns should be induced to establish institutions on the principle of the Turgot school. He also recommends a more extended course in the drawing schools, and especially the introduction of modelling.

Evidence of M. Thunot, President of the Conseil des Prud'hommes, at Paris.

Intervention of the Conseil des Prud'hommes in cases of dispute between master and apprentice.

The action of the Conseil des Prud'hommes in regard to apprentices appears to be limited to the settling of disputes on the proper carrying out of the indentures of apprenticeship, and in such cases the only means they can adopt is that of arbitration or conciliation. For instance, in case a master ill-treats an apprentice the Prud'hommes have no power to punish him by fine or otherwise, and when parents insist on withdrawing their children from their apprenticeship before the expiry of its term, the Prud'hommes can estimate the damages which have accrued to the master, but are without the power of enforcing the payment of them.

In nearly all the cases of dispute the appeal to the Council is from the side of the parents, and the charges against the master are those of either ill-treatment, insufficient feeding, or overwork. The two former of these accusations are generally discovered to be ill-founded, and to proceed either from the desire of the parents to withdraw their children from their apprenticeship, and thus enable them to earn as journeymen higher wages than they are capable of doing as apprentices, or from the idleness and intractability of the children themselves. The charge of overwork is, however, often a true one; not unfrequently in some trades children are kept at work from 6 o'clock in the morning to 9 or even 10 at night; in others, under a pressure of work, they are compelled to work during a part and sometimes the whole of Sunday. Of course these hours are illegal, but the law regulating the labour of apprentices seems to have fallen into desuetude, and the system of inspection is singularly ineffective. The Prud'hommes can only interfere when a complaint is lodged before them, so that they are powerless to see to the execution of the law.

Complaints against master generally not founded in truth.

M. Thunot remarks that it is rare that disputes are submitted to the Council as to the execution of indentures of apprenticeship entered into under the auspices of the religious and charitable societies for encouraging and aiding apprentices. This may be owing to the care which these societies exercise in superintending and overlooking the conduct of their wards. As in any case of disagreement the parties have to appear before the Council to state their own case in person, it would be difficult to make one of these societies a party to the dispute, though any evidence they may wish to give by letter on the subject or cause of the disagreement would be admitted.

Complaints rarely lodged by apprentices under the patronage of religious or charitable societies.

Evidence of M. Bader, Director of the Professional School at Mulhouse.

This school was established by the city of Mulhouse for the professional instruction of the children of manufacturers and of persons in easy circumstances, and preparing them for an industrial career. At eight years of age they are admitted, and can, if they please, remain until their eighteenth year; but in practice it is found that a large majority leave before they attain that age, either to go to other schools or to enter business. The vacancies thus created are, however, soon filled up by others entering, so that the school maintains its average number. The course of education commences with six years of perfectly general instruction, about equiva-

General account and objects of the school.

lent to that given in the Lycées and other secondary schools, except that the dead languages are replaced by those of England and Germany. At the seventh year of their studies the pupils—then at the age of fourteen years—are divided into two divisions. The first consists of those who are only to remain at school for two years more, and are then to enter mercantile houses or the professions, and require no special technical instruction; these receive an instruction rather general than applied. The pupils of the other division remain at school for another four years, or to their eighteenth year, and receive an instruction partly general, the subjects of which are literature, history, mathematics, the physical and mechanical sciences, and drawing; partly special, which is divided into courses on the construction of machines, the textile fabrics, and the chemical arts. Besides this, there are workshops which the pupils of the second division attend for two hours every day. As soon as a pupil enters the school he commences the study of modern languages, which he learns to speak rapidly; and as regards geometrical and machine drawing, he is no longer allowed to copy as soon as he knows the use of his pencil. One of the great advantages of the system is that the pupil grows up in what may be called an industrial atmosphere, in the midst of machines and workshops. Far from having a foolish contempt of manual labour, he learns to hold it in esteem. He applauds his comrades who excel in that branch as much as if they had carried off the prize for literature or mathematics, and above all, he learns at an early age to make use of his ten fingers. The system has, however, also its inconveniences; the children get tired of remaining ten years at the same school, and the parents get tired of sending them. Thus it happens that the number of pupils in the last year but one scarcely amounts to 20, and in the last year to 10, and among these very few have commenced their studies at the school. For this reason, also, the pupils, who on an average number 300, are not divided equally among the 10 years; but lately this total has been decreased by the effects of the cotton crisis, the cotton manufacture, printing, and dying being the staple trade of Mulhouse and the district.

Financial condition of the school, and social position of the pupils.

The terms of the school are 700 francs yearly for boarders, besides the cost of the schooling proper, which varies according to the division that the pupil attends or the special studies he may adopt. The school fee in the first three classes is 90 francs, then it rises to 120 francs in the intermediate classes, and finally to 200 francs in the higher; besides this, a fee of 200 francs is charged for attendance at the chemical laboratory, the mechanical workshop, or the weaving school.

From the city of Mulhouse is received an annual grant of 6000 francs. The governing body consists of the principal manufacturers of the city, chosen by the Minister of Public Instruction. As regards the social position of the pupils, they appear to be the sons of manufacturers, or managers of large works, and of professional men and Government employés. Of course the day pupils are inhabitants of the city, while the boarders come principally from the Department of the Haut-Rhin; besides which, the school is attended by about 20 foreigners from Switzerland, Germany, Holland, Russia, Italy, and Spain. The pupils belonging to families residing in the district obtain employment on leaving school either in their fathers' houses or in those of firms connected with them by ties of business and friendship. Many of them who are in need of it are enabled at once to gain their own livelihood, obtaining appointments as assistants of the managers of machine workshops and cotton mills, while it has happened that some who have received a training in the school workshops have on leaving obtained employment at wages varying from 2 to 4 francs a day as fitters and forgers.

The practical training of the school is divided into three divisions. The first is given in the machine workshop, the second in the laboratory, the third in the weaving school; which latter, however, is distinct from the Professional School. There is also a carpenter's workshop, in which a sort of preparatory training is given to the pupils of 12 and 13 years old, the object of which is not to turn out carpenters or joiners, but to give the pupils a taste for manual labour, and to form the hand and the eye; it may almost be considered in the light of an athletic exercise. The students attend in this shop only one hour three times a week, and are practised in planing, in making small articles of cabinet work, and at the lathe. Manual labour.

The machine workshop includes fitting, metal turning, forging, and mounting machines. The machine tools, which, as well as the four-horse power steam-engine, have all been made by the pupils, comprise forty fitting vices, three gearing lathes, a screw-cutting lathe, a drilling machine, and a small planing machine. This workshop is attended by the pupils for four years two hours a day. They commence by learning to file and finish a piece of iron, then to make a square and other small tools. When they have acquired a certain amount of skill they are employed in the making and fitting of machines and tools used in the workshop itself. At the present time (1864) they are engaged on a large machine for planing iron. When the workshop is completely supplied with tools it is The machine workshop.

intended that the pupils should construct a collection of small models to serve as illustrations at the lectures. Already they have made a small steam-engine, which can be taken to pieces on the lecture table. The staff of the shop consists of an engineer, who has the chief direction, and who is at the same time professor of mechanics in the school; of a foreman, who instructs in fitting and mounting, the use of the lathe, and the forge; thirdly of a stoker, under whose direction the pupils in turn learn to heat the boiler and to drive the engine; lastly, of a permanent apprentice, who, while learning his trade, is charged with the care of the tools and with keeping the shop tidy. All the expenses of this shop, including wages and fuel for the forge and for the engine, but not including the salary of the engineer-director, who is paid as professor of the school, amount to 600 francs a year. It may be noticed that these two hours of manual labour five days in the week do not prevent the students from acquiring as much knowledge of mathematics, physical sciences, &c., as they would obtain in the Lycées, class for class. This labour is rather a rest for the mind; to the extent it is carried on in the school it by no means hinders the pupil's progress in more serious studies. One of the features of the general scheme of instruction of the pupils in the mechanical arts, is that the training in manual labour and in drawing serve as an important aid to the courses of lectures in kinematics, on the steam-engine, and in the technology of railways. The same pupils must attend the course of spinning, which is rather one on the construction of the spinning machine than on the process of manufacture. The same professor being charged with instruction in machine drawing and mechanics, and with the direction of the workshop, it is easy to see how these three subjects are worked together and assist one another.

Chemical
laboratory.

Pupils who are intended for the industries dependent on chemistry are admitted for two hours every day to the chemical laboratory. In addition to the general instruction in chemistry which they get there, there is a special course of analysis and another of printing and dyeing. Besides the chemical pupils who follow the general course of study, those who have already completed their schooling and wish to learn nothing but chemistry, can pass their whole time at the laboratory and complete their studies in one or two years, according to the amount of chemical knowledge they possessed on entering. For instruction in the chemical industries of printing and dyeing the school has obtained the co-operation of one of the most important houses in Mulhouse, that of Dollfus-Mieg, which permits the students, under the charge of their pro-

fessor, to pay periodical visits to their manufactory, when the chemists and employés of the establishment give themselves considerable trouble that the students may see and understand the different processes of manufacture. The laboratory of the school includes a large room for manipulations, or the laboratory proper, a room for analysis, a vestibule (containing steam and water baths, an assay furnace, a copper still, a printing table, and an indigo tub), a small laboratory for the professor, where are kept the balances and delicate instruments, and a shed in the open air for manipulations which cannot be carried on in the laboratory. It is the intention of the managers to add a hall for keeping specimens, a small cabinet for quantitative analysis, and a large room for calico printing, which is to be furnished with (besides the tools used in hand printing) a roll machine for teaching the process of printing by power. Recently important alterations and improvements have been made in the laboratories, in consequence of a visit of M. Schützenberger, the professor of chemistry at the Polytechnic of Zürich. The ventilation has been improved, the water-taps increased in number and arranged so as to give the manipulators a constant supply of nearly chemically pure water, and water baths and steam baths have been placed within the reach of each. Very shortly it is hoped to replace the use of charcoal and wood-spirit as a fuel by gas, which up to the present time is not supplied from the gas-works during the daytime.

The staff consists of the professor, his assistant, and an attendant. The cost of material varies according to the number of pupils, but the annual estimate amounts to 2000 francs. In addition, each pupil passing his whole time in the laboratory pays 300 francs for the apparatus and chemicals he uses, every one attending two hours a day 150 francs, and a fee of 20 francs is charged to those students of the mechanical and weaving sections who have obtained permission to attend the laboratory once a week.

Each of the students carries on his work by himself, the beginners being under the direction of the assistant, and the more advanced under that of the professor. The number of pupils learning chemistry as a specialty scarcely amounts to twelve, and about the same number attend for two hours every day. As the former come at eight o'clock in the morning, they are under the immediate superintendence of the professor and his assistant for the first two hours of the day, but for the next two hours they are left more to themselves, while the attention of the teachers is directed to the others. Although the number attending the laboratory is so small, there does not seem to be any reason to expect that it

Method of
instruction.

will be or should be greater. It is true the chemical section is organized in such a way that the instruction is of the greatest importance to all intended for manufactures which depend upon chemistry, yet it is given more particularly with reference to the industries of printing, dyeing, and chemical products. The number of chemists employed in these trades is not so great as might be supposed. Manufacturers of chemical products and calico printers do not like to have a large number of apprentices. In every manufacture there are certain particular processes the secret of which the proprietors do not care to divulge, and generally in the Department of the Haut-Rhin, the employment of these processes is restricted to the sons or nephews of the manufacturer. All the large establishments belong in general to several partners; the chemist therefore is one of the family, so that there is only a small opening in this line for young men who have no family connexions with the great houses.

The weaving
school.

The weaving school was founded by the principal manufacturers of the department of the Haut-Rhin, under the patronage of the Industrial Society (*Société Industrielle*) of Alsace, and is entirely distinct from the Professional School, although it is attended by the students of the latter. It admits only day-pupils, and resembles in many respects the weaving schools at Lyons, except that the latter are for instruction in hand weaving, while the one at Mulhouse is fitted with power looms only. Students of the Professional School who are destined to become manufacturers of textile fabrics attend this school for three years, while their comrades of the mechanical and chemical sections take the special courses at their own school. They are at work during the whole day in this establishment under the direction of a professor of weaving. The weaving school was founded three years ago, and is maintained by its founders: its director is appointed by a committee of management. It is well organized and very successful, and is now under the direction of M. Fries, who has been manager of several works both in England and in Germany. The annual fee is 600 francs. As to the position of the pupils, it would be difficult to say that the school addresses itself to any one class of society rather than to any other: there are to be found there the sons of manufacturers as well as of their employés. The instruction is given to each student individually, and consists in teaching him to read a design for figured goods and to place it on the cards. Each student keeps a note book, in which he enters the general rules of weaving and their application to stuffs, from the simple to the most complicated. The course includes also

the preparatory operations, and a knowledge of raw materials, and of the different methods of treating them.

The students of the professional school attend the course of instruction in science and literature at the Upper School of Science and Literature (*Ecole Préparatoire à l'Enseignement supérieur des Sciences et Lettres*), which also was established, and is maintained by the municipality of the city of Mulhouse, and in order to avoid confusion and to utilize all their teaching power, the courses in science and literature at the Professional School (with the exception of a complementary course of mathematics) have been suppressed, and the students of the last two years confine themselves entirely to the technical instruction. Although M. Bader is himself a professor at the upper school he does not approve of this division of labour, and thinks that it leads to bad results.

Superior instruction in science and literature.

With regard to the question of professional education in general, M. Bader is of opinion that all institutions for technical instruction should be established by, and under the direction of, the governing bodies of the towns in which they are founded, provided always that the professors and teachers be selected and appointed by the Minister with public authority. In all cases much latitude should be left to the initiative and action which each town may be inclined to take in the organization and maintenance of such schools. The secondary instruction in the Lycées in France is now organized on such a plan that the pupils could with ease pass at their fourteenth year from the Lycées into technical schools established on the plan of the Professional School at Mulhouse, supposing them to be intended for an industrial career. With the exception of the dead languages, the general instruction given during the first six years at the Professional School resembles in all respects that of the Lycées.

Views of M. Bader on the condition of technical education in France.

But an exaggerated idea is apt to be formed of the desire which manufacturers have to possess employés who have been trained in the technical schools. To make use of a commercial expression, the supply exceeds the demand. It is very usual in the manufactory to look down upon the pupils thus prepared, and to attribute to them (often without reason) excessive pretensions. For inferior employments, as that of foremen, the masters prefer taking young people whom they know, sons of their operatives and employés; no great general knowledge is required of them, it is rather a question of trustworthiness. Technical knowledge they can pick up in the house itself. As far as regards the workmen themselves, the proper method will be to give them the means of instructing themselves outside the shop, rather than to train them in special schools.

Theoretical knowledge not always valued by employers.

Law regulating
the hours of
labour of
children
practically a
dead letter.

Schools in
Württemberg.

Opinion of M.
Bader of what
is necessary
to render
technical
instruction in
France
efficient.

M. Bader joins with all the other witnesses in deprecating the relaxation of the law regulating the hours of labour for children, and in decrying the system of inspection under which it has been allowed to fall into its present state of desuetude. He regards this as the great obstacle to the spread of primary education among the working classes. He would even extend the action of the law further, and make it apply to children above 12 years of age. In this respect M. Bader thinks most highly of the Improvement Schools (*Fortbildung Schulen*) in Württemberg, a system under which the apprentice is passed on from one school to the other. Many little towns have associations of masters who bind themselves to allow their apprentices two hours in the evening for study at these schools. More than that, in the country the teachers are charged to teach not only children but adults the principles of agriculture and arboriculture. For these teachers practical courses are held in the normal schools; they are taught to graft and prune trees in a scientific manner, they are instructed in viniculture, and when they take schools in the villages they have to spread the knowledge they have acquired.

Summing up what he thinks necessary for technical instruction in France, M. Bader says: "I ask for the working classes, properly so-called, schools in or by the side of the workshop. I do not deny that for certain particular industries, where the workman must almost be an artist, apprentice-workshops may be of great value; as, for example, in the clock and watch-making trade. But the more I observe the facts, and the more I study the question, the more it appears to me doubtful whether there would be any advantage in establishing apprentice workshops for mere workmen; for they learn the special craft which they have to practice in the works where they are engaged far better than they could do in the workshop (always slightly artificial) attached to a school."

"On the other hand I take the intellectual culture of the working classes and the diffusion of scientific knowledge among them, as well as the development of industrial and artistic drawing, to be a subject of the highest importance. I desire that the schools attended by the young operatives should receive the highest possible organization, and that the instruction given there should be completed by courses of applied mechanics, physics, chemistry, and natural history, arranged in such a way that they may be attended by the workmen in the evening and during the hours of leisure."

"For young persons who are able to devote a longer time to school before commencing their apprenticeship, I recommend that (according to the resources of the locality) endea-

your should be made to insure the complement of elementary education, that which was formerly called higher primary education (*instruction primaire supérieure*), and which is intended for children of from twelve to fourteen years of age. Secondly, I believe, that for young persons who can remain at school to their sixteenth year, the regulation as to professional study lately promulgated by the minister of public instruction is in the right road; and I can say as much of the Turgot school."

"Lastly, for those who are to form the staff (*état-major*) of our industries, we must certainly have special schools, both industrial, commercial, and agricultural. These schools must be of different degrees of which the types as far as regards manufacturing industry are to be found in the Schools of Art and Trades, in the industrial section of the Professional School at Mulhouse, in the Central School of Arts and Manufactures, and in the School of Mines. Above all, in such schools as these it appears to me to be necessary that apprentice-workshops should be established, for the young men cannot as apprentices attend the workshops of the factories."

Evidence of M. Girardon, founder and director of the Central School at Lyons, Professor at La Martinière School.

At Lyons there are two schools devoted to industrial instruction—La Martinière School and the Central School; the first of these is a free school and is attended by the children of the lower classes; the second is for the children of those in more easy circumstances.

The school of La Martinière was founded thirty years ago, by General Martin, and has since been enriched by a legacy of M. Eynard, one of the governors of the school. It now possesses property of about two millions of francs, of which about a half is represented by the building, furniture, museums, &c. The collection of machines given by M. Eynard, is constantly receiving additions of models made in the workshops of the school. The total revenue of the school is about 120,000 francs. The general management is in the hands of a committee of seven members appointed by the municipal authorities, of which seven, one resigns every year, but is eligible for re-election. A principal, a vice-principal (*censeur*), and superintendents form the administrative staff, while the instruction is carried on under the care of professors, assistant-professors, and masters. The school is entirely gratuitous, not only as regards instruction, but as regards the pupils' appliances of all sorts. Besides this a certain number of rewards of the value of from 60 to 120

General account of La Martinière school.

frances are given to the poorest families, whose children have distinguished themselves by industry and good conduct. The pupils are only admitted between the ages of 12 and 14, and their number is limited to 500.

Social position
of the pupils.

As a rule, the children are the sons of chiefs of workshops, tradesmen, foremen, and artizans in different trades. They are intended to become skilled workmen and foremen, and leave school at an age which permits of their going through a practical apprenticeship in the trades they have selected. Care has been taken to prevent the change of class which would inevitably take place if they were kept at school to a more advanced age, for then they would seek employment as clerks, instead of adopting the handicrafts in which they have a much greater chance of succeeding. The number of children of families in more easy circumstances attending La Martinière is small, but is sure to increase at any time of commercial suffering.

Hours of study
and examina-
tions.

All are day scholars, and the hours of attendance are eight a day, broken by an interval of two hours for meals. Of the eight hours two are devoted to mathematics, physics, and mechanics; two to drawing, one-and-a-half to chemistry and the remaining two to writing, grammar, and the theory of manufacture. The latter course is attended by only a limited number of pupils, but attendance on the other courses is compulsory, and absence is punished. In the first year instruction in mathematics, physics, and mechanics, which all must attend, is divided into four sections, each containing about 80 pupils; and in the second year into two sections, each containing about the same number. From this it is evident that the number of boys passing from the first to the second year is reduced one-half, partly from want of elementary knowledge, partly on account of incapacity; some are taken away and others dismissed. At the end of about two months the indifferent pupils are selected from the six sections to the number of about 40 or 50 in all (or seven or eight from each section), and formed into a separate class where they receive instruction commensurate with their ability. Examinations are held at the end of the year, when a board composed of engineers and manufacturers awards prizes to the most distinguished pupils. Diplomas are granted to those who have terminated their studies and have distinguished themselves in the different subjects. The number of these diplomas varies from 25 to 30 in a section of from 80 to 90 pupils.

Recapitulating:—The number of pupils of the first year which enters at La Martinière is about 350 and reduces itself to 180 in the second year. Of these 180 leaving school at

the end of their second year, there are about 60 who receive diplomas, but it may be reckoned that as many more have received sound instruction and have obtained a satisfactory result. All almost without exception will have acquired in a remarkable degree the habit of sustained work.

The majority of the pupils of La Martinière succeed in the careers in life which they select. There are in the town of Lyons, a large number of skilled artizans who have sat on the benches of the school; the principal dyers are old pupils of the school, and to them is due the increased prosperity of the trade of the town by the remarkable discovery of the new and fashionable colours. The Polytechnic School has also received many of the pupils, and it is to their first success in La Martinière that they owe the brilliant position they have obtained, a just recompense of their assiduity.

Career of the pupils after leaving school.

The method of teaching adopted in giving general instruction seems to be peculiar to the school, and consists of a system of constant questioning and collective answers. For this purpose each pupil is furnished with a small black board; the teacher puts a question which all the pupils answer on their boards, which answers he then corrects and explains. In addition to this, the ordinary method of oral examination is also maintained, but in a peculiar fashion. The question is put, and the teacher waits a short time before fixing on the pupil who is to answer it. By both these means the attention of the pupils is fixed and constantly kept alive; none can escape showing their ignorance or deficiency. When sums in arithmetic or examples in algebra are being worked, the class is divided into three sections, and each pupil is furnished with a printed set of questions designated by letters and numbers, and two slates, one called the working slate (*ardoise de travail*), the other the answering slate (*ardoise de réponse*). The teacher selects for each section a certain number of examples in such a way that the distance between two boys working the same sum is at least five feet. These the pupils are required to work on their working slates. After they have finished they are required to transcribe one arbitrarily selected by the teacher, on to their answering, slates, and these are then rapidly collected by the monitors, and spread out before the teacher in the order in which the boys are seated. The teacher is thus enabled by a rapid glance to detect those who are in fault or have failed to comprehend the principles on which the examples are to be worked.

Method of teaching employed.

The method by which descriptive geometry is taught is also peculiar, and well worthy of notice. For this study each pupil is furnished with a small tin box about 8 inches long,

Method of teaching descriptive geometry.

4 inches broad, and $\frac{3}{4}$ inch in depth. This box is filled with yellow wax, prepared so as not to turn hard. It represents to the pupil the horizontal plane of projection. The edge opposite to him is the ground line, and he can imagine for himself the plane of elevation passing through this ground line. Small strips of iron wire serve to represent lines in space, the projections on the horizontal plane by laying them on the box, and those on the plane of elevation by fixing them on the edge which represents the ground line. The movement of these strips is effected by direction of the teacher, and the pupil is enabled easily to understand a diagram in descriptive geometry.

Instruction in drawing consists of machine drawing in perspective and projection, as well as of the method of tinting. At first the pupil draws on his slate to facilitate correction and avoid waste of paper. The first models which he has to draw from are figures in iron wire representing cubes, prisms, pyramids, &c.; then he draws parts of machines, and finally complete machines. Afterwards he proceeds to drawing projections first in figured sketches, and then in drawings to scale; finally he completes his studies by learning to tint. The pupils are arranged in a circle round the model, which is placed on a stand in the midst of them. They are seated on stools carrying a stage to support the slate or drawing board. There is also a class for modelling and moulding, but it is not numerously attended.

The work-
shops.

All the pupils divided into several sections pass an hour a day in the workshops, where they are instructed in carpentry, the use of the file and of the lathe. They are practised in each of these kinds of labour alternately, and spend a month at each in succession. Here they learn the proper use of the tools, skilful and intelligent masters show and explain to them as soon as they enter that which they could learn in the manufactory only by imitating and a long course of observation. Here again the son of a carpenter, if he shows more aptitude for the file than the plane can make up his mind to enter the trade of a locksmith, mechanic, or fitter. And besides, anyone having passed through this succession of labours, has acquired a fund of skill useful to him in any handicraft.

The Central
School of
Lyons.

In order to be a complement to La Martinière, and to provide for the upper classes, an equally good education as that which that school does for the children of artisans, a number of gentlemen, manufacturers, and merchants, have founded the Central School of Lyons. The capital, which at first was 100,000, and was subsequently increased to 150,000, and then to 200,000 francs, was employed partly

in erecting the necessary buildings and furniture, partly in covering the expenses of the first few years, before the institution was self-supporting. The constantly increasing number of scholars proves that the hopes of the founders will not be disappointed.

All the pupils are day scholars only, and pay 700 francs a year, including the cost of manipulations in the laboratory, and all the courses in the workshop. With terms as high as these, of course the school is only frequented by the children of parents in good circumstances; but as the founders have kept in view the object of establishing an institution rather of public utility than for private advantage, the council of the school have created a number of half scholarships (*demi-bourses*), appropriated to several Departments, by which means a number of young persons belonging to the less wealthy classes, but whose intelligence and industry make them worthy of the benefit, can participate in the advantages of the school. When the experience of several years had proved the utility of the school, and had shown that the education given there met the wants of a large portion of the inhabitants, the Municipal Council of the city, the General Council of the Department, and the Chamber of Commerce, founded on their part a number of scholarships. Hitherto the pupils who have gained these scholarships have distinguished themselves as well by their work as by their aptitude for it. Of 80 pupils entered this year (1864), 27 are exhibitioners.

The funds of the school are now entirely derived from the fees of the scholars, and have to meet the expenses of instruction as well as those of general management. The budget at present stands thus :—

	Francs.
Expenses of instruction	24,800
Managing staff	5,800
General expenses, including rent, heating, lighting, &c.	17,400
Total	48,000

The very small sum charged to the expenses for instruction can only be explained by the disinterestedness of the professors, who have voluntarily given a great part of their time to render the school a success. It is much to be desired that the resources of the school may increase to such an extent as to permit of the professors being remunerated on a scale proportionate to the excellence of the instruction which they give.

School hours are from seven to noon in the morning, and from two to six in the afternoon. The first hour, from seven

Terms and
scholarships.

Financial
statement.

Routine of the
school.

to eight, is devoted to manual labour in the workshop. Thus there are eight hours of schooling for five days in the week, or 40 hours in all, which are thus divided:—

First Year.

Mathematics	-	-	14	} 40 hours.
Physics	-	-	6	
Chemistry	-	-	6	
Drawing	-	-	10	
English	-	-	2	
Natural history	-	-	2	

Second Year.

Mathematics	-	-	14	} 40 hours.
Chemistry	-	-	6	
Drawing	-	-	10	
English	-	-	2	
Natural history	-	-	2	
Accounts and industrial law	-	-	2	
Resistance of materials	-	-	4	

Third Year.

Mathematics	-	-	4	} 40 hours.
Mechanism and machine construction	-	-	7	
Metallurgy and mining	-	-	5	
Chemistry	-	-	9	
Drawing	-	-	10	
English	-	-	2	
Geology and Mineralogy	-	-	1	
Civil engineering	-	-	2	

Examinations
and diplomas.

Every Thursday there is an examination of all the sections of the school, and for the second and third year pupils, an excursion to some industrial works. General competitions at Easter, and the examinations at the end of the year, taken in conjunction with the daily notes serve as a basis for classifying the pupils, for their promotion into a higher section, and for the choice of those to whom at the end of the third year diplomas are adjudged. The examination of the pupils of the third year is held by a board composed of two professors and a director, in the presence of the council of the founders. The diplomas are of two degrees: those of the first degree are given only to those pupils whose general figure of merit corresponds to the term *very good*, and those of the second degree to the figure of merit *good*. Notwithstanding the unfavourable condition that so small a number of pupils entered the school in its first year, the number of diplomas adjudged exceeds the half of the number of the pupils who leave the school in their third year,

and one-third the number of those who enter in their first : without doubt, when the number of candidates is so great as to permit of a selection, the proportion of diplomas will be much increased. There is every reason to believe that next year (1864-65) there will be two-thirds of the pupils leaving who will have obtained diplomas. Hitherto, the managers of the school have been successful in finding employment for their late pupils. A large number are with railway engineers and in chemical works, in mines, in metal and iron works; some have gone to the works at Creusot, and several have become dyers.

The method of instruction at the Central School differs in some respects from that adopted at La Martinière, because the programme is essentially distinct. At the former it is necessary to insist on practical science as the basis of instruction, and the pupils are required to be quick and skilled in the application of formulæ, and in the calculations arising from them; at the latter it is the theoretical portions of the sciences which are of more importance, and skill and rapidity in calculation can be to some extent sacrificed. In consequence of this, the use of the small black boards already described as being employed in La Martinière, is even more extensive in the Central School. With these little boards the pupils follow attentively the reasoning of the teacher; they can even precede and foretell it. The pupils themselves discover a formula instead of following the process of obtaining it in a book or on a diagram. Of course every time a question is answered, there are a number of incorrect solutions, but this number decreases with every new attempt. At the commencement of the session, the first year pupils who have not been initiated into this method, and have hitherto been accustomed when at school to do nothing but listen more or less attentively, to work at a time most agreeable to themselves, and with doubtful regularity, experience a kind of astonishment when they find themselves compelled to work at command, and to submit their own will to that of the teacher. However, when the first moments of astonishment are passed, they are well pleased with the method; because they find it relieves them of every effort to compel themselves to work; they have only to yield to an impulse given to them.

The chemical laboratories are very conveniently arranged, and large enough to permit of all the pupils manipulating with the greatest facility. In this branch of their studies they acquire great skill.

Apart from a few philosophical instruments, indispensable to the comprehension of certain branches of physical and

Method of instruction.

Chemical laboratory.

Collections of apparatus.

mechanical science, the collections consist entirely of models of apparatus, and of parts of machines constructed at the school workshop specially for the purposes of instruction, either by the pupils or the foreman. In this way the already large collection of models and apparatus is continually being augmented. Besides this, there is a collection of upwards of 1,500 drawings tinted and mounted, about a square yard in size, representing figures and sections of all sorts of mechanical, physical, and chemical apparatus. These drawings have all been made at the school and in part by the pupils.

Workshops.

At the workshops of the school the pupils under the direction of able foremen are practised in working at the lathe, at carpentering, at tin-working, at fitting, and at the smith's forge. Here it is no longer an object as at La Martinière to discover the peculiar vocation of each pupil, nor to give an elementary knowledge of tools to one who is to become a skilled artizan; it is rather that those whose future career will place them in a position to direct and superintend workmen, may be able to show them how to set about their work, may know the use of the tools, and the technical terms. Another object of this course of manual labour is to enable the pupil to apply what he has learnt in his theoretical studies; thus in making a tin coffee-pot, where the spout joins the body of the pot, he will apply his knowledge of the intersection of two cones, which he has acquired in the course of descriptive geometry; he will turn the model of a connecting rod in wood; in short there are a thousand ways in which he can make his theoretical studies available in practice.

Instruction in drawing.

At the Central School as at La Martinière, the pupil from his first entrance begins to draw in perspective from models; then he passes quickly to projection, which is more closely connected with the labour of the workshop. As soon as he has acquired sufficient skill, the following plan is pursued: a model is placed before 12 or 14 pupils; the teacher takes it to pieces before them explains the principal arrangements, draws attention to the different forms, and after having given all necessary explanations removes the model. The pupil must then execute from memory and without instruments, sketches of the whole, and of the details and sections required by the teacher. When the time fixed for the execution of this drawing from memory has elapsed, the model is replaced before the pupils, the teacher points out the corrections to be made, and a pupil placed close to the model takes all the measurements and dictates the dimensions. The model is once more removed, and from the

sketch the pupil must now make a drawing to scale. This kind of work, and a little drawing of ornament and practice in tinting, constitute the study of the first year. During the second and third year, the pupils while continuing from time to time the drawing from memory, pass on to another kind of study. Drawings of machines are given to them, but not to be servilely copied; they are required to draw a section on a line marked on the drawing. In this way the pupil can never copy a drawing without understanding it; he must analyse it in all its particulars for himself. To others, again, is given a drawing, as for example of a steam-engine, taken from some work on machinery, together with the text which accompanies it. The teacher explains to the pupil a certain portion of the machine—the cylinder for instance, with the arrangement of its parts; the latter must then draw every piece of it (as if it were taken completely to pieces) to a certain fixed scale. When this work is finished the copy is removed, and the pupil must proceed to draw the whole from the drawings which he has already made of the parts. In these two divisions the young men are also practised in making designs of parts of machines according to the principles of the strength of materials which they have learned in school; designs for boilers according to the principles of physics; designs of machines or of buildings of all kinds as applications of the sciences which they have studied at school. As a supplement to the study of drawing, the pupils of the second and third years visit every Thursday certain manufactories which are fixed upon, and must bring back figured sketches of some of the machines; these they must afterwards reproduce as finished drawings to scale. Afterwards from all these drawings a selection is made of those which possess most interest, or are of the greatest utility, and these being lithographed, an album is made intended specially for the use of the pupils of the school.

In reply to the question as to what is necessary to be done for technical education in France, M. Girardin commences the exposition of his views by dividing the pupils for whom such an education would be a benefit into four classes:—1st. Children of the working class before entering on their apprenticeship. 2nd. Children of the same class already entered on their apprenticeship. 3rd. Adult artizans. 4th. Young persons of the wealthier class.

La Martinière school may be taken as a type of the school required for children of the first description. It must be remarked however that 400 children at the most present themselves every year for admission to this school, from among a population so large as that of Lyons, it is there-

Views of M. Girardin on what should be done for technical instruction in France.

Schools for children of the working class.

fore reasonable to suppose that in towns of less importance similar schools could be created on a much smaller scale, with scarcely more expense than that for the primary schools. Two or three rooms of a size commensurate with the number of children it would be necessary to accommodate would be enough for all practical purposes.

Courses for apprentices.

Apprentices can only give a very limited time to the study of theoretical subjects; it is not a school which they want, but special courses of instruction held on Sundays and in the evening. These courses might be held in the same places and under the same teachers as those of the schools recommended for the first category, especially in the great manufacturing centres. For the pupils of these two classes the attendance at the instruction, either by authority of their parents or of their masters, should be compulsory.

Lectures for adults.

For adult artisans already courses of evening and Sunday lectures have been established in most towns, but M. Girardin holds that in general they have been attended with some inconvenience. These lectures are in most cases open to every one, and consequently to distinct classes among the audience; the serious audience who come to be instructed, and the curious audience which as regards numbers is generally vacillating. The presence of people who are unknown to them disconcerts those who attend for instruction; they are hurt if they have to show their ignorance, and the teaching becomes of small value to them. The lecturer is compelled to enter into too many details for those who know already, and cannot give sufficient for those who have no prior knowledge of the subject. As an instance of this the evening courses of lectures established at Lyons by the managers of La Martinière and by the Society for Primary Instruction (*Société d'Instruction primaire du Rhone*) are not attended by a number of adults at all in proportion to the population of the city. To avoid these obstacles M. Girardin would recommend the transformation of these lectures into classes, to which only those would be admitted who could subscribe a fee for the instruction they are to receive and thus show their desire to profit by it.

Secondary schools for the wealthier class.

It is assumed by M. Girardin that the institutions for the three above-mentioned classes would to a great extent give gratuitous instruction, and therefore to maintain them in an efficient condition government assistance would be required; this on the contrary would not be the case in schools founded for the wealthier classes. If a school of this description really meets a want it ought at the end of a certain time to be self-supporting, and the necessity for causing it to flourish would be for those who have an interest in it, a powerful

stimulus to introduce all improvements which can tend to its success. But though in these new schools of a higher degree the fees demanded from the pupils ought to suffice for their support, it can scarcely be claimed that they should be reserved for the class who are in a position to pay for themselves. Here it is that the State can effectually step in by endowing the schools with scholarships and exhibitions which will permit of pupils in less easy circumstances availing themselves of an instruction which would otherwise be beyond their means. Such an encouragement as this on the part of the State would be of immense service to the youth of the working classes, and be one of the best means of increasing the industrial power of the country.

M. Girardin also alludes briefly to the School of Art (*École des Beaux Arts*) established at Lyons. Notwithstanding the success of the pupils of this school as designers, the manufacturers now nearly all resort to the offices in Paris for designs which were formerly executed in Lyons itself. Now-a-days every nation can buy taste, paying for a design in the same way as he would pay for any other marketable commodity, and whoever has the most money will be the highest and last bidder. School of art at Lyons.

Evidence of M. J. J. Bourcart, Manufacturer at Guebwiller, Founder of the Popular Courses at Guebwiller.

The substance of this evidence has been given almost at length by the Commission in the Notes to their Report ; it is unnecessary to repeat it here. It will be found in the translation of the Report and Notes of the Commission on Technical Instruction, p. 138 to p. 149.

Evidence of M. Leloup, Honorary Director of the Upper Trade School at Nantes.

This school was founded in the year 1834, under the title of the Upper Primary School (*École Primaire Supérieure*), a name which gave no idea of the instruction carried on in it. Notwithstanding this, however, 60 pupils took their seats on the forms of the school; and this number would have been greater had a boarding house been annexed to the establishment. The next year the school numbered 90 pupils, of whom 25 were exhibitioners maintained by the commune and 65 paying a monthly fee of 5 francs. The exhibitioners were admitted by public competition open to the children of 12 years of age and upwards on leaving the elementary schools, and they were the sons of artizans, foremen, small History of the school.

tradesmen, and employés in the public offices and large commercial houses, while the paying pupils belonged to parents in easy circumstances and to several members of the Municipal Council. For the first expenses of the establishment the Council General voted a sum of 500 francs, and the Minister of Instruction added a grant of 1,000 francs. In the second year of its existence the revenue of the school (including the buildings granted by the Municipal Council) amounted to 10,000 francs, and the number of pupils to 100. The amount of the monthly fees was divided among the professors in proportion to their salaries. At the end of the third year, the number of pupils had increased to 40 exhibitors and 70 paying pupils; public examinations were held twice a year, and the Municipal Council through a special commission were informed of the progress and good results of the school.

Evening
classes.

At this period free evening classes were established at the school to enable working men to acquire a knowledge of theoretical science which they found so requisite in their trades. These classes were held in four subjects: industrial chemistry, elementary mathematics, geometry, and mechanics, and were attended on an average by 100 students yearly. The instruction was voluntarily given by the professors of the school, but at the end of three years their salaries, which only amounted to 1,500 francs for each, being so exceedingly small they were obliged to give up the gratuitous portion of their labours.

Decline of
the school.

In 1840, after six years passed in a temporary abode, the school was removed to a building belonging to the town of Nantes, which had formerly been occupied by the Primary Normal School. This change of residence seems to have affected the fortunes of the school badly; the building is far from the centre of the town, and there are no means of extending it so as to make a boarding school of it, nor is there room for re-establishing the night classes. Notwithstanding this drawback, however, the success of the school was maintained until the year 1848; at the end of that year the number of pupils amounted to more than 200, including an elementary school of 40 pupils which was a sort of nursery for the professional school. At that time the annual expenditure amounted to 17,000 francs, of which 1,000 only came from the General Council; there were 75 exhibitors and 115 paying pupils, and the monthly fee had been raised from 5 to 8 francs. Now, however, the prosperity of the school began to decline, and in 1853 M. Leloup himself was compelled in consequence of ill-health to resign the management. When he left there were 196 pupils, of whom 65 were exhibi-

tioners and 53 belonged to the preparatory division, and the monthly fees of the latter were only sufficient to cover the salary of the master and assistant master of that division. The revenue amounted to 13,000 or 14,000 francs, of which about 8,000 francs came from the municipal treasury. There were eight professors and two assistants, who gave the following courses of instruction: 1, a course of industrial chemistry, physics, and natural history; 2, a course of mathematics and mechanics for the scholars of the 3rd and 4th years; 3, a course of elementary mathematics and book-keeping; 4, a course of descriptive geometry; 5, of artistic drawing, and modelling; 6, of history and geography; 7, of English; 8, of religious instruction and moral philosophy; 9, of vocal music. Physical science, particularly chemistry and its numerous applications, formed the key to the whole course of instruction of the school; the programme and progression of the studies were drawn up entirely with reference to it.

From 1853 to 1862 the school has passed successively under the management of two directors, but it continued to decrease in point of numbers until in the latter year it was attended by only 50 pupils, of whom 18 were paying. It was in this year that M. Leloup in the capacity of honorary director was called on by the Municipal Council of Nantes to discover the causes of this decline, and to find a remedy; and with the aid of the actual director and of the zealous professors he hopes to have launched the school in a new course of prosperity. During the past year (1863) the number of pupils has more than doubled.

Re-appoint-
ment of
M. Leloup.

The school is now recruited principally among overseers, foremen, petty officers of the public services, small manufacturers, retail tradesmen, &c. As regards the placing of the pupils, it may be stated that all those who have attended the school during the four years of study easily find situations on their leaving. But many are taken away at the end of the third year by parents who are compelled to profit by the labour of their children; of this number are those who enter the paternal trade, of whom the school can count nearly 300. About a third of the whole number pursue the trades of the chemical and the machine manufacturer, and another third is absorbed by the mercantile houses, public services, special schools, and mercantile marine. It is a remarkable fact that so many adopt the trades of their fathers. As several of the pupils have entered the mercantile marine (there are above 40 who are now masters of coasting vessels and captains of ships), it has been found advantageous to give a course of instruction in spherical trigonometry and

Constituency
of the school.

physical geography, in drawing of maps, &c., though much remains to be done to render effective any special instruction for mariners.

Workmen,
properly so
called, not
educated at
the school.

It must be understood that the school produces chiefs of workshops, clerks, and foremen, but not workmen properly so called. Workmen can only acquire the practice of their art by apprenticeship in the workshop and by the use of tools, which cannot be afforded in schools of the order of the Trade School of Nantes. For such schools to give instruction in the theory of sciences, which can be applied to manual labour, by means of well managed evening classes seems to be the best service which they can render to the working classes to raise them above the ordinary level, and advance them in the path of progress. But there exists at Nantes an apprentice school (*école d'apprentissage*) founded by the Industrial Society of that place (*Société Industrielle de Nantes*), which has been of great service to the working classes, and which might be taken as a model for an institution of this sort.

Apprentice
society at
Nantes.

This society charge themselves with the care of children whose parents are too poor to teach them a trade; they place them with a master, arrange the indentures, regulate the conditions and length of the apprenticeship, look after both apprentice and master, and finally grant to the poorer aid both in food and in money, a part of which last is deposited in the savings bank. Out of his working hours the apprentice receives in a school established purposely for him lessons in drawing, geometry, &c. to complete his primary education. The society pay the salaries of the teachers, provide the class material and furniture, and award every year prizes to the most meritorious. Even after they are out of their time the connexion of the apprentices with the society does not cease; they can still compete for diplomas of ability (*diplômes de capacité*), a sort of extra prize which places those who obtain them in the first rank of their trade. The society, which dates from the year 1830, is aided in its efforts by grants from the General Council, the Municipal Council, the Minister of Public Instruction, and the Minister of Commerce, Agriculture, and Public Works.

Proposition to
establish
evening classes
in connexion
with the trade
school.

The evening classes for apprentices are very well attended, and Mr. Leloup is anxious to re-establish those which formerly existed at the Trade School. He is of opinion that the instruction in such classes should bear on the following subjects: A course of graduated, and above all practical, instruction in arithmetic and geometry, without theoretical demonstrations; linear and art drawing; the French language, dictation, and exercises on the black-board. In

addition he recommends a course of social and industrial economy, which should particularly treat of the relations between labour and capital, between the employer and the employed; of the duties of a man towards the State, society, his family, and himself; of the conditions of free labour and the necessary connexion between right and duty; and, lastly, of the simple ideas of religious morality. It might be desirable that lessons in modern history and in vocal music should be given to complete this instruction, and that a well-chosen communal library should be opened and placed at the disposal of the working man, but under the responsibility of the director of the Trade School.

In reply to the question as to what should be done in France to develop technical education so as to be of benefit to industry in general and to the working classes in particular, M. Leloup gives it as his opinion that no uniform list of subjects, nor absolute programme, can be laid down so as to meet all the different requirements of the various classes. If the elementary education must be the same for all, that is to say, if there is a foundation of elementary education which is necessary to every one, it follows that when once this has been acquired the instruction must be subdivided and specialized, and made to meet the wants of every description of manufactures, and the positions which correspond to them. He would recommend after the primary schools the following institutions for those who are to engage in industrial pursuits:—

1. Apprentice schools (*écoles d'apprentissage*) on the type of that founded by the Industrial Society of Nantes for artisans.
2. Trade schools (*écoles professionnelles*) for employers and heads of manufactories, or at least for overlookers, managers, chief clerks, &c.
3. Special schools (*écoles spéciales*) of which the type should be the Central School (*École Centrale des Arts et Manufactures*), forming a sort of technological faculty, for those who are to have the chief management of works of art and industry, and training heads of schools and professors of the intermediate schools.

The industrial army would thus draw its soldiers from the apprentice schools, its officers from the trade schools, its general officers from the special schools. This progressive system could be easily apportioned: thus, in the apprentice schools, reading, writing, cyphering, geometry, linear drawing, drawing of ornament, and the mother tongue; and, as a complement to this, evening and adult classes. In the

Views of
M. Leloup on
what is neces-
sary to extend
technical edu-
cation in
France.

trade schools superior primary instruction; then history, geography, physical geography, literature, drawing, mathematics, physics, mechanics, chemistry, natural history, accounts, commercial law, &c.; each of these branches to the degree that might be necessary. In the special schools all the higher studies, scientific theories and their applications in general, everything in short which is necessary for those who are to have the management of great undertakings in arts, manufactures, or commerce.

Proposed organization of trade schools.

For the organization of the trade schools M. Leloup recommends:—

1. Three years of preparatory study, compulsory on all the pupils, and giving them a common education.
2. Two years of the study of science applied to industry in general and to some local specialties in particular.

For the three years of preparatory study a uniform programme; for the two years of special study a variable programme, according to the locality and the requirements of its manufactures and commerce. Lastly, for all the classes, courses of social, political, and industrial economy, and a knowledge of constitutional law, graduated according to the age and ability of the pupils. It may seem that the programme for the upper classes of the trade schools may become too varied for any general arrangement, but it is not so in reality. During the first term of the fourth year the pupils should be required to take a survey of what they have learnt in the three preparatory years, and decide, with the permission of their parents, on attending one of the following divisions of special study: 1. The chemical arts; 2. The mechanical arts; 3. The agricultural arts; 4. Navigation and naval construction; 5. Public works and commerce; 6. Special schools. Omitting the fourth and sixth of these, it may be conceived that careful study in the laboratory of chemistry, applied to the reproduction of a great number of industrial products, and to processes; then the analysis of raw materials, minerals, soils, manures, products of the soil, &c.; the fitting and modelling of different kinds of machines, the application of descriptive geometry to the construction of buildings and manufacturing machines and tools; lastly, an attentive consideration of commercial details, and of the ways and means of transport;—all these would form a course of special instruction for the pupils who terminate their studies at the end of the fifth year.

How technical schools should be founded and maintained.

In considering the question of the support of these institutions, M. Leloup believes that the lower class of schools—those for apprentices and night classes for working

men—may be left to private resources (as those of a free society) and to private management. The efforts of philanthropic individuals, or of associations of individuals, are a noble example for the working man, and tend to neutralize the unfortunate antagonism which so often exists between capital and labour. Moreover, it is only to such a society that the charge of watching over an apprentice and the carrying out of the conditions of his apprenticeship could be confided. But the trade and special schools occupy a different position, and must be left entirely under the care of the State. It is the State alone which possesses the administrative power and the unity of sentiment necessary to create this new system of instruction, whose success would be uncertain in other hands. It alone (and this is very important) can remove the prejudice of inferiority attached by parents to communal or private instruction when compared with the State education given in the lycées. It might be thought sufficient to intrust the management of these institutions to the municipal or departmental authorities; but the local character impressed on public schools is always of less authority in the eyes of parents than that which is possessed by a Government institution. The councils of the departments and of the communes should only be called on to participate in the establishment of secondary schools for special objects in three ways: 1. To provide a building under the conditions exacted by the State; 2. To found and maintain a certain number of scholarships; 3. To make an annual report to the Minister on the modifications, improvements, alterations, and additions which there will be any room or necessity for introducing into the studies of the fourth and fifth years—a means perfectly necessary in order that the requirements of the locality may be made known.

Evidence of M. Rossat, Doctor of Science, Head Master at Charleville.

When M. Rossat took the school at Charleville at the commencement of the scholastic year 1853–1854, it contained about 130 pupils, who received primary instruction until the age of 12 to 14 years, and then a professional instruction given in four divisions corresponding to the four remaining years of study. The subjects of this instruction consisted of the French and German languages, history and geography, mathematics, physical science, drawing, and book-keeping, and were intended to prepare pupils for such of the public services as required a diploma, for some of the special schools, such as those of St.

Account of the
progress of
the school.

Cyr, Châlons, and Alfort, and for commercial and industrial pursuits. On M. Rossat's succession he commenced by extending the professional instruction, while still pursuing an organization which appeared to respond to the wants of the country, by establishing by the side of it a secondary instruction to prepare pupils for the two bachelorships (*baccalauréats és lettres et és sciences*). From the very first he began to modify the organization of the professional classes by increasing the number of divisions from four to six, and by adding a seventh and last year specially for mathematics as a preparation for the Central School (*École Centrale des Arts et Manufactures*). This instruction is parallel to the secondary instruction in Latin, while all the subjects which are common to the classical and professional divisions are taught to the whole school together. The mixed classes are held in the afternoon, while the hours of the morning are devoted on the one side to classical, on the other to industrial studies. For the more practical part of their training the pupils had been in the habit of attending the workshops of locksmiths, carpenters, and blacksmiths in the town, but it was found that this habit was fatal to discipline and morality, and accordingly M. Rossat determined upon creating a workshop of his own. For this purpose he rented a large estate close to the school buildings, the house of which had been used as a magazine during the period of the continental blockade. He has now established there a fitting shop working by steam and capable of containing 100 anvils, several lathes, boring machines, portable forges, etc.; a carpenter's shop with lathes, sawing machines, and benches; a smith's shop with room for 20 men; a good laboratory with separate tables for the pupils; a lecture theatre capable of accommodating an audience of 150; a gymnasium, covered in; and a large garden for practice in botany, agriculture, and arboriculture.

The workshops
and laboratory.

Altogether M. Rossat has observed that the practical are in no way injurious to the theoretical studies. On the contrary in the subjects descriptive geometry and industrial drawing manual labour seems to stimulate the pupils. Practical work in the shops and laboratory occupies two hours a day, and yet the pupils beg that that time may be extended; already many of them possess great skill. The shops and all the works are under the direction of a civil engineer, and under him are three foremen, one in the fitting, another in the smith's, and the third in the carpenter's shop. The proceeds of the labour of the pupils, if any, goes towards the maintenance of the workshops. In the fitting shop the most skilful pupils are at present occupied in putting together a steam engine to replace the portable engine which now drives the machinery;

others are making models and parts of machines to be placed in the machinery collection of the museum. The carpenters, of whom there are about thirty, learn the use of the saw, the plane, and the lathe; they make patterns for the iron casters, joiners' work, and carpenters' work, and models for solid geometry. There are fifty smiths engaged at the forge in the repair of tools, &c.; and in the same shop there are employed a few pupils who are intended for the veterinary schools. Lastly, under the direction of the head master himself, the remaining pupils are occupied with manipulations in the laboratory.

There are now altogether 330 pupils, of whom 170 are boarders. Besides the ordinary classes in literature and science, there is a class in applied mechanics, another in construction, a third in industrial drawing with copies in relief, and also one in commercial and administrative law. The pupils are admitted to the laboratory for manipulation, either for two hours or during the whole day. Manual labour is carried on in the workshops for two hours a day, five days in the week. Pupils who are intended for agricultural pursuits also take part in the duties of the workshop; out of school hours, or early in the morning during summer, they can practise in the botanical garden or in the kitchen garden; twice a week they make excursions in the neighbourhood to botanize, to inspect the fields and the method of cultivating them. The same pupils attend the lectures of the professor, a veterinary doctor, on applied zoology, and during three hours a week they learn the theory of the sciences bearing on their future profession.

It has been a great object with the head master to prevent any kind of distinction being established between the literary and scientific divisions of the school, so that there may be no jealousy among the pupils. With this object he keeps together during play-hours, in the study-rooms, in the refectories, and in the dormitories as much as possible the students of the corresponding sections of the two divisions; and if the number of such a combined class should become so great as to make two divisions of it, he would do so by making the pupils draw lots. He regards it to be of great importance that the professional should be placed on the same level as the classical studies; there should be no rivalry except in industry and good conduct. However, the number of pupils in the professional is greater than that in the classical division; there are at most a third of the whole number in the latter, the rest are in the primary and professional divisions.

The school draws its pupils principally from the lower middle class, though the establishment of the workshops

Course of instruction.

Jealousy between the two divisions prevented.

Clientèle.

has considerably increased the number of those in more easy circumstances. The boarders are admitted at 8 years old, and the day pupils as early as 6 years; children of these ages join the primary division. As soon as they are well grounded in the elements they are taken into one of the great divisions—professional or classical—according as their parents may select. The professional course consists, as has already been stated, of six classes corresponding to the six years of study, but an intelligent and diligent boy can pass through two classes in one year without leaving any gap in his studies; for it is so arranged that the subjects of instruction in each class shall be completed by the month of April, the rest of the year being devoted to repetition, so that a lad of ability removed from the lower class can follow with advantage the lessons of the class into which he is removed. Some of the pupils destined for the public services pass their examinations before reaching the higher classes, but the greater part remain to the end; such are those who are to become manufacturers, builders, ironmasters, and farmers. Others with less ambition only aspire to the position of foremen. It has been in contemplation to establish night classes for workmen, but hitherto the want of accommodation and the great occupations and pecuniary position of M. Rossat have not permitted of it.

Finances.

The terms for boarders are 600 francs a year (not including school materials), with an additional 100 francs for the use of the workshops and laboratory. For day boys the terms vary from 50 to 100 francs a year according to the class which the pupil attends. The school is entirely a private speculation of the head master; he receives nothing in the way of grant, either from the town or the department. His predecessor had 600 francs a year from the municipality of Charleville, in the shape of exhibitions for the day pupils, but these have now been allowed to drop. He has invested a total capital of 300,000 francs in the purchase of buildings, furniture, and materials, and notwithstanding the lowness of the terms and the existence of a staff of 25 professors, teachers and foremen, the establishment is remunerative.

Perfect freedom of action of M. Rossat.

The result of these circumstances, however, is that M. Rossat is perfectly free in his movements, and can introduce any arrangement into his school or any alteration in the programme which he pleases. Thanks to this liberty of action, not only the success of the whole school, but also the progress of each boy has been highly satisfactory. In the course of ten years 300 pupils have passed the examination of bachelor, or have entered the special schools, or been admitted into the public services, without counting those

who have been received into private manufacturing houses ; last year (1863) for example, out of 34 nominations, 31 were successful. Another consequence of this freedom is, that the programmes have been so arranged that a pupil can pass from the professional to the classical division or *vice versâ*, according to the wishes of his parents or his own predilection.

It has been stated that M. Rossat entertained the project of opening night classes for adult artizans, which, provided they were well organized, would, he is sure, be well attended. He intends to put himself into communication with the manufacturers of Charleville-Mezières, who employ a large number of workmen in the iron founding, smelting, sugar-baking, and brushmaking trades, and from whom he hopes for great assistance. He would use his influence with these gentlemen, most of whom he knows from their having children at his school, to obtain a diminution of the hours of labour of their apprentices, on condition of their attending the classes. He is also not without hopes of securing pecuniary aid for the night classes from the municipality. To interest the workmen, and to guard their *amour-propre*, he would demand a small fee for attendance, the proceeds of which would be spent in reading and class books. It would also be an advantage if the adult pupils could be questioned during the lessons, but this would require to be done delicately for fear of wounding their pride and exposing them to ridicule. The means for establishing such classes are abundant enough. All the professors and teachers of the practical school have voluntarily and gratuitously offered their services for both the primary and secondary instruction of adults. The institution itself could provisionally provide all the materials necessary for teaching ; machines of all descriptions, copies, casts and decorations. In the lecture theatre would be given the lectures in applied mechanics, practical geometry, physics and chemistry, accompanied by models, apparatus, and experiments ; in the drawing room would be held the classes in drawing, provided with copies and models. Lighting and firing would also be at the expense of the institution ; and with all these elements of success M. Rossat has no doubt of arriving at a good result.

Project for
night classes
for adults.

Replying to the question, what should be the nature of the efforts made by Government for organizing a complete system of technical instruction, M. Rossat divides such instruction into two categories, secondary and primary. For secondary instruction he recommends that existing schools which have not prospered should be transformed into technical schools with workshops attached to them, while schools

Views of
M. Rossat on
what is wanted
to improve the
state of techni-
cal education.

which have hitherto been successful in their theoretical studies should have a course of practical instruction added to them. As regards the new institutions which it is intended to establish, their organization must rest upon the principle of the theoretical combined with the practical, that is to say, of a literary and a scientific division running parallel to each other. But both the founding and the maintaining of them must be left to private effort, the action of the Government being confined to encouraging and stimulating, either by honorary rewards, such as diplomas, or by scholarships and exhibitions; it is under these conditions alone that the institutions can preserve that freedom of action so necessary for their success. Let only the circumstances be favourable, let the departments provide buildings, and the Government offer pecuniary aid, and there will be no lack of able and intelligent men willing to take upon themselves the responsibility of keeping schools for technical instruction. Only place the two divisions, the literary and the scientific, on the same level, so that there may be no rivalry between them, except in respect of the services which they render, and men of worth will devote themselves to the one or the other according to their tastes and capabilities.

Technical
instruction in
primary
schools.

For primary instruction intended for the children of working men not so much requires to be done. M. Rossat would only recommend that drawing should be taught in all the elementary schools, and that the children should be kept longer at school. In this way the gap between the primary schools and evening schools for adults and apprentices, would be nearly filled up, and the apprentice would possess sufficient elementary knowledge to profit at once by the scientific study in the night school. Evening classes might also with great advantage be established in the country districts, where, with a slight addition to their salary, the national school masters (*instituteurs*) would be glad to devote an hour or two every evening to maintaining their relations with their old pupils. Might it not also be possible to have by the side of the village school an experimental garden where the children could acquire a love for flowers and plants, and learn the treatment of fruit trees and the cultivation of vegetables?

Programmes of
study and
systems of
instruction.

Being asked if he could approve of programmes of study and detailed schemes of instruction to be laid down by Government, M. Rossat would prefer that each head master should be allowed perfect freedom of action to make his own arrangements, to press those points which he may deem most important, and to fill up any gaps that he may discover. Programmes only make of the teacher a perfect machine, and hamper and cramp him at every step. Besides, it will be

necessary that a technical school should adapt itself to the industry of the district in which it is situated; in one place it must be a mining school, in another a weaving school. All this would be impossible under a general system of instruction emanating from the Government.

In one way the Government can render great service, by creating diplomas for schools of this description; there is such a diploma for pupils leaving the Schools of Arts and Trades, and why should such not also be given to the students of a school like the Practical School at Charleville. It is not uncommon, says M. Rossat, for a pupil of his to complain, "When we leave the school at Châlons we shall receive a certificate or testimonials which will aid us in getting situations, but we have nothing of the sort when we leave your school. Your signature may be perfectly respectable, but it does not carry the weight of that of a director of one of the schools of arts and trades." If there were diplomas for pupils of the private schools, they would not only be a guarantee of ability, but would also serve as a stimulus to the young men who are preparing themselves for a commercial or industrial career, or for the public services.

Evidence of M. Malet, Superior Officer, Professor at the Imperial Artillery School at Douai.

The educational institutions of the town of Douai may be divided into two essentially distinct groups—the primary schools and the public classes, or technical classes as they may be called. The primary schools are four in number, one of them being an upper school, and they cost the town annually 1,500 francs; the technical classes receive aid from the town to the same extent, and consist of the following subjects:—

1. A class in building and machine construction.
2. A class in drawing.
3. A class in writing.
4. A class in modelling, sculpture and moulding.
5. A class in manual labour in wood and in iron, for the purpose of training journeymen carpenters, joiners, fitters, smiths, turners in wood and iron.
6. A class in music, a sort of conservatory which provides young persons, if not with a profession, at any rate with the power of increasing their means of living.
7. A class of designing for embroidery (suppressed in 1848 for financial reasons) was attended by more than a hundred workwomen, and could with little trouble be re-established.

Educational
institutions
at Douai.

All these classes are attended by upwards of 200 young people from 12 to 18 years of age, and even beyond; they are in general pupils of the primary schools, children of artisans, pupils of the Lycée, apprentices, and clerks.

Class in
construction.

1. The class in construction includes all the scientific studies which bear on the construction of machines and buildings, and their practical applications. Commenced in 1790 it was in 1805 transformed into a special class of architecture, to which in 1831 an industrial class was attached, at which time also it received the name of class of industrial architecture (*cours d'architecture industrielle*) until the year 1849, when M. Malet assumed the directorship of it and adopted its present form. This class, like every other, meets in a building of its own; it costs the town annually 2,500 francs, and is directed by a professor and his assistant. It meets on Tuesdays, Thursdays, and Saturdays for one hour and a half early in the morning, when it is attended principally by apprentices, and from ten to twelve for schoolboys and clerks. The annual average number of attendants is 80, of which about two-thirds belong to the working classes. Every one able to read and write fairly and knowing the first four rules of arithmetic is admitted. Adults are permitted to attend, but there does not seem to be any disposition on their part to make use of the advantages offered to them, although the class has met in the evening and on Sunday specially for their benefit. The class is entirely free, only pupils must provide themselves with drawing materials, and the poorer members are even furnished with these at the expense of the town. Every pupil on admission writes down his trade or profession, or that which he wishes to adopt, and this serves as a guide to the professor as to the special studies which he should undertake.

Method of
instruction.

The instruction is divided into four sections: — 1, the preparatory section; 2, the industrial section; 3, the section of science and fine art; 4, the section for applied study. The latter of which the work is executed either in the apprentice workshop or in those of the masters differs essentially from a simple apprenticeship in that the forms which the material is made to assume are explained to the pupil, and executed according to fixed principles, thus combining intelligence with skill of hand. In each section the course of study takes on an average two years, and therefore amounts to about six years altogether. Each section corresponds to a particular class of trade. The *preparatory section* corresponds to the different handicrafts; the object of it is simply to enable the pupil to learn and execute all kinds of industrial drawing, by means of geometry, either in two or three dimen-

sions, and to make known its applications to the different kinds of projections by means of plans and elevations of sections. The *industrial section*, attended by those pupils of the preceding section who wish to push their studies further, takes in the subjects necessary to the trades engaged in the construction of machines and buildings, such as joiners, carpenters, upholsters, stoneworkers, marble masons, locksmiths, fitters, stokers, painters, &c. The pupils of this section form excellent workmen, foremen, superintendents of works, surveyors, designers, &c. The *upper or scientific section* is attended by pupils who having been successful in their studies in the two former divisions, are able to attain a higher position in their trades, or are preparing themselves to become civil and mechanical, engineers, chiefs of works, clerks of works (*conducteurs*) in the service of the Bridges and Roads, and architects; some even proceed to the Government schools. In this section are taught mathematics, pure and applied, mechanics, descriptive geometry, constructions, architecture, &c. The *section for applied study* comprises the pupils of the first and second sections and of some of those of the third; the course of instruction consists as its name implies of the execution by the pupils of works either in wood, iron, stone, or even papier mâché, designed to illustrate the results of their theoretical studies by means of templates taken from the rough sketches.

Every year is held a competitive examination under a board composed of scientific and industrial notabilities, who pronounce on the merit of the competitors and on that of the scientific and practical works which they have executed, and which are publicly exhibited. Prizes are awarded by the municipality of the town. No diploma is given; it would be indeed unnecessary, for the works which they can execute and the recommendation which they get from the managers of the classes are quite sufficient to obtain good positions for the pupils. Examinations
and diplomas.

Attached to the classes are two apprentice-workshops, one for working in wood, the other for working in iron, each in charge of a director who is engaged to give in it practical instruction in manual labour. These workshops are situated in an annexe of the town hall which contains the normal school and the upper primary school. The practice includes in the one shop working at the forge, fitting, and turning in metals; in the other joining, carpentry, upholstery, and turning in wood. It is expected that in time these shops will be capable of turning out work which can be sold and become a source of profit to the institution. The number of pupils is nearly 50, about equally divided between the Apprentice
workshops.

shops. Work is carried on every day except Thursday and Sunday, it begins at half-past five and concludes at half-past eight in the morning. The management of the workshops is intrusted to the master, who is director of the primary school, but under the control of a committee.

**Class in
drawing.**

2. The class in drawing meets every day from half-past twelve to two o'clock, formerly it used to meet from five to seven, and probably the old arrangement will be resumed as it had the advantage of accustoming the pupils to draw both by artificial light and by daylight. This class contains about 70 or 80 pupils of from 13 to 14 years of age. As to the method of instruction, it is that which is generally adopted; the basis is the study of the figure, and effect is obtained by line shading. But this method, though good in principle, is in the opinion of M. Malet not one which is to be recommended for those who are not fine art students, but have need of the power of sketching rapidly and accurately. He would wish to see introduced three divisions, one preparatory, another industrial, and the third artistic for the students who wish to become artists and aspire to the Fine Art School (*Ecole des Beaux Arts*).

**Class in model-
ling, sculpture,
and moulding.**

3. The class in modelling, sculpture, and moulding is held every morning from seven to half-past eight o'clock in summer, and from six to eight in the winter. There are 25 or 30 pupils whose ages vary from 13 to 15 years. As in the class of construction this class is divided into three sections: in the *preparatory section* is practised modelling of the figure and of ornament, and this is attended by all the pupils without exception. The *industrial section* includes sculpture both in wood and in stone; it is attended by workmen or sons of masters who have been several years in the class. Lastly the *upper section* is devoted to the execution of designs (*projets*) of industrial art designed on a given plan; it is attended by those students who having passed through the other sections wish to become sculptors, but cannot attend the ateliers of the masters. In the two latter sections moulding after different methods is taught. Pupils who desire to make art a profession, model without intermission the best examples of ancient sculpture, then with the sanction and under the guidance of the professor they proceed to Paris to continue their studies, sometimes at the cost of the town or the Department.

**Class in
writing.**

4. The class for writing is held every evening from half-past five to half-past seven o'clock, and is attended by about 30 pupils, of 14 and 15 years of age. This class is also divided into three sections: the *preparatory section*, in which the students get rid of the bad habits contracted in their earlier training; the *industrial section*, in which the pupils

are initiated into different kinds of commercial writing; and lastly the *upper section*, in which they learn signs and characters sometimes employed in manufactures, and certain ancient and artistic kinds of writing.

5. The academy of music, which offers to young people of the working class a pleasing recreation, may also shortly be alluded to, distinguished as it is by the talent and zeal of its professors. The classes commence at half-past six in the morning and last till noon; they are held every day, and contain on an average 70 pupils. Musical academy.

The question of what is necessary to be done that professional instruction may be extended and developed in France to the greatest possible extent, appears to M. Malet to be on a fair road of solution by the exertions of the Commission before which he is giving evidence, and by the appointment of the Sub-commissions to collect information in what is being done in the same direction in England and Germany. From this inquiry will result a general project for the organization, as well as a plan of the different studies, upon which the Commission can, if it pleases, again consult competent persons. M. Malet's own views lead him to propose the creation of a Superior Council of Professional Instruction (*Conseil supérieur de l'Enseignement professionnel*), holding its sittings at the Ministry of Public Works, which could be charged to make the system known in the different localities by means of inspectors, and those localities would then form Municipal Committees (*Comités Municipaux*). The Municipal Committees should be composed of competent persons appointed by the Prefect upon the presentation for selection of a certain number of names by the local administrative; the chairman of the committee might be appointed directly by the Minister, at the instigation of the Prefect, in order to avoid local irritation. Such a plan would possess the advantages of a central administration, while permitting the different localities to adopt a kind of instruction most suitable to the wants of each district. Views of M. Malet on what is necessary to extend technical instruction.

In principle the action of the Government should be purely that of giving moral support, for technical instruction is undertaken more in the interest of the locality than in that of the State. But in reality if this important question were allowed to wait for the initiative of the communes, many years would elapse either through indifference or ignorance before it could be taken into serious consideration. It would appear then necessary that the Government should strengthen its policy of giving moral support by making pecuniary grants and by scholarships founded in certain schools; Action of the Government.

and further that it should encourage by public assistance the schools which have been founded by private energy.

Resumé of the
opinions of
M. Malet.

Summing up his opinion, M. Malet thinks that technical instruction should be established on the same footing as that of science and literature by dividing it into three parts, primary instruction, secondary instruction, and upper instruction. The former of these would be largely attended, and should be extended even into the rural districts. This general organization should be allowed to adapt itself to the staple trades of any particular localities, which, while preserving their liberty of action, would require a little stimulus occasionally. Not that the instruction should be broken up and subdivided among different districts and departments, but the same results might be produced by taking as the basis of industrial instruction that in the construction of buildings and machines, and adding to it instruction in the sciences applied to the special industries of the locality. The direct action of the Government, while respecting the efforts of the localities, should be limited to the creation and maintenance of scholarships, which would form an indispensable encouragement in order to overcome local indifference, jealousies, and inertia.

Evidence of M. Aimé Gros, Manufacturer at Wesserling (Haut-Rhin), Member of the Legislative Body.

Schools at
Wesserling.

The manufacturing establishment at Wesserling being completely isolated and distant from any place of importance, the proprietors have found it necessary to provide instruction for the children of their employés and workpeople. With this object they have founded both a primary and a secondary, or rather as they call it an intermediate (*intermédiaire*) school; the former is entirely for elementary education similar to that of the communal schools; in the latter the instruction is of a more advanced character, and makes the school a sort of preparatory institution to the colleges and Lycées. In the intermediate school the following is the programme of instruction:—French and German are taught with great care and success, so that the pupils when they leave school are able to write both languages, if not with elegance, at any rate with ease and correctness; arithmetic and geometry, with a course of plotting and levelling; physical geography; history, principally that of France; and religious instruction. To complete this instruction there is a course of drawing both linear and of ornament; and besides a special school for drawing is attached to the institu-

tion for students who intend to pursue industrial drawing and architecture as professions. The duration of the course of study at the intermediate school is four years; the pupils enter at the age of ten or twelve years, and are all day-scholars. The method of instruction is the same as that adopted at the mutual schools (*écoles mutuelles*); the more advanced and intelligent pupils take it in turn to act as monitors or pupil-teachers of the lower classes. Every year there is an examination and a distribution of prizes, and besides that a register is kept by means of marks of the progress and conduct of each pupil. Very often the number in attendance has reached 60 or 70; now it is about 40.

The pupils are drawn from the families of the heads of the different branches of the factory and the upper officers and clerks. At the end of every year examinations are held in all the primary schools of Wesserling and its immediate neighbourhood, as the result of which the most successful candidates are admitted to the intermediate school. For a long time the instruction given at the intermediate school was entirely gratuitous, but in consequence of the numerous applications for admission a small monthly fee of one franc is now charged. Rent (600 francs), material, supervision, cleaning, and lighting all included, the institution costs the partners about 6,000 francs annually. The salary of the professor is 3,000 francs.

Clientèle and finances of the intermediate school.

One of the greatest difficulties the proprietors have to encounter is the placing of the pupils when they leave school, although they have hitherto always succeeded in finding situations for them. As there are many branches in the establishment many clerks are required, and it is in that capacity that the majority of the pupils of the school enter the business. The whole staff of the works is recruited from the intermediate school, there is no stranger on the establishment. Many of the young men on leaving school go into the works as apprentices—mechanics, joiners, and carpenters; the term of apprenticeship is three years, and afterwards they make a tour of the different manufacturing districts of France for a year, at the expiration of which they can, if there is room for them, enter at Wesserling as workmen or foremen. Some find employment in machine factories, and others in the railway works, where they obtain good positions.

Difficulty in obtaining employment for old pupils.

The pupils of the intermediate school attend the special school of drawing three times a week; when they have left the school they can if they please attend the drawing course.

Special school for drawing.

Even those who have entered the workshops, especially in the engraving shop, are sent by permission of the chief of the shop to the drawing school to keep up their studies. In the

Wesserling establishment many engravers and designers are employed in the manufacture of chintzes, and these are all taken from the school. The pupils learn drawing there completely, especially the drawing and colouring of flowers. After having acquired the elements they enter with the composers (*compositeurs*) as finishers (*finisseurs*), in order that they may attain the degree of perfection which is wanting. All the finishers, and many of the designers, at the Wesserling works have been educated entirely at the schools on the spot, and several of them end by becoming composers. In order to refine their taste the designers pass every year two or three months at Paris.

Risk of France being surpassed by other countries in design.

In reply to the question, whether there is any risk in France being surpassed by other countries in industrial design, M. Gros replied, that the English are still obliged to come to Paris for their designs; there are many designers in France who do nothing but work for English manufacturers.

Night classes.

Formerly night classes for workmen were held at Wesserling itself, but have now been established in the surrounding villages. This arrangement was preferred by the working men themselves, that they might be enabled to reach home at an earlier hour. These night classes are well attended and are gratuitous; the instruction is given by the national schoolmasters, who are paid by the communes.

Opinion of M. Gros on the best way of developing professional instruction.

M. Gros being asked his opinion on the best means of developing professional instruction in France, thinks that in all centres of industry the manufacturers should associate themselves and establish schools similar to those at Wesserling, so that they may be able to recruit their staff from them. The success of such institutions must depend upon the facility with which appointments can be found for the pupils who leave them with a good character. It is plain that the Government cannot find employment for the pupils of these schools, but they can render most efficacious assistance by means of grants in aid and a regular system of inspection. The visit of the inspector would alone be a great encouragement. A programme of instruction bearing Government authority would also be well received.

Evidence of M. Kern, Minister at Paris of the Swiss Confederation, formerly President of the Council of the Federal Polytechnic School at Zürich.

The evidence of M. Kern consists entirely of an account of the Zürich Polytechnic, of which full details will be found in the third and concluding volume of this work, in the report

of the Sub-commission on the technical schools of Germany and Switzerland.

Evidence of M. Gouin, Civil Engineer, Paris.

In the provincial towns and in places distant from the populous centres, workmen must be regularly trained in their trades; they must be made accustomed to the best methods and processes of labour, and there, consequently, masters are compelled to keep apprentices. But in Paris there are many locksmiths who manufacture very careful work and who prepare workmen for the mechanical trade; there is no necessity for the masters to train them themselves. Besides, in Paris, apprentices would with difficulty find work. On these grounds, in the machine works in Paris there are no apprentices; they are trained at the locksmiths, and since these execute a great variety of work, sometimes of extraordinary delicacy, they have with them young men capable of executing any kind of work from the finest to the coarsest.

Not now so great a number of apprentices as formerly.

At M. Gouin's works they have a great number of the pupils of the Schools of Arts and Trades at Châlons, Angers, and Aix, and are well satisfied with their good conduct and willingness; they are not often very skilful, but they possess acquirements which soon enable them to become very fair workmen. After being at certain time in the works some of them turn out good designers and foremen. Nothing is more difficult to form than a machine designer and mechanical engineer; a hundred engineers for making railways can be found, before one who can make a good machine is discovered. To become a good mechanical engineer great patience is required; five or six years must be passed in a drawing office and a year or two in making tracings, so as to know a machine as a whole as well as its details, and not to be obliged to have recourse to calculation or drawings to know how to trace a piece which has to be made. Just as an artist is not compelled to measure every time the proportion of the head to the body to make a correct study of the figure, but has it all in his eye, so a machine designer ought to have in his head all the relations of the different parts of a machine. This knowledge is only acquired after a prolonged examination of excellent models. Naturally we do not find in the pupils of the Polytechnic School and of the Central School the necessary patience and attention to the minutest details. These gentlemen wish to advance more rapidly, whilst the pupils of Châlons and of Angers are more patient, and have no ambition to obtain a position all at once. Consequently they remain in the drawing offices and in the

Pupils of the Schools of Arts and Trades.

workshops long enough to be able to understand thoroughly the construction of machines and to become skilful designers, to whom a piece of work may be intrusted with security.

Use of machine tools.

At Châlons the pupils have only a general and vague knowledge of mechanics, they must, therefore, perfect themselves, and it is good for them to remain in the workshops three or four years before entering the drawing school. One point entirely escapes them at Châlons; they have scarcely any machine tools there, and those which they have are not of the most modern description. The pupils make very good forgers and fitters, but the use of improved tools is quite unknown to them. Every day machine work is employed more and more in manufacture, and it is therefore very important to know how the machines act and are employed. In this respect the pupils of Châlons are behind, and some time elapses before they can recover the lost ground.

Apprenticeship not of so great importance as formerly.

On all these accounts, apprenticeship is not of the same importance as it was formerly, and it is for the same reasons, independently of those given before, that there are now not so many apprentices as there used to be. Besides, everywhere it is now attempted to make the workman a specialist, and it is impossible in a workshop where this is done but that the apprentice should become a specialist also. At the Council of the Prud'hommes, parents complain every day that their children do constantly the same thing from one year's end to the other, and that thus they never get to know the secrets of their trades. The council insist that the masters should make their apprentices learn all the works which they execute themselves, but they can go no further. Besides, by the side of a workman who continually makes the same thing, it is very difficult that an apprentice should pass through all the stages of his trade. Apprenticeship is always necessary and remains the sole means of initiating a lad into the mysteries of his trade, but now-a-days what is required of an apprentice is rather regularity of attendance and conduct, and that he shall conform to the wishes of his master; this is not always very pleasant for an apprentice, but is not the less indispensable in the present condition of the manufacture of a great many articles.

The law of 1851 and action of the Council of Prud'hommes.

The law of 1851 on the apprentice contract stipulates that an apprentice shall have two hours a day for completing his education; this arrangement ought to be mentioned in the indentures, but it is seldom done. In the Council of Prud'hommes it has often been asked that greater authority should be given to the indentures. For the most part there is no written contract; it is merely a verbal agreement, which on one side or the other it is convenient to forget. It has

often been asked by the Council of Prud'hommes, that instead of leaving the depositing of the contract with the secretary of the council optional it should be made compulsory on the contracting parties, and there is no doubt that such a measure would have an excellent effect. The parents, often very ignorant, who enter into these contracts on behalf of their children, do not understand the importance of the engagements which they make, and are always tempted to release themselves from them under the most frivolous pretences. They believe that having made only a verbal agreement there is nothing binding on them. The Council of Prud'hommes are compelled to have recourse to witnesses to find out the truth, an inquiry which is always very difficult. It is necessary, therefore, that to deposit the written agreement with the secretary of the council, instead of being optional as it now is, should be made compulsory by law; it would be merely a simple deposit, without the council being called on to give their advice on the terms of the contract; they would only take notice of it in case of dispute. If the deposit were compulsory, the contracting parties would look on it in a more serious light, and would not break the agreement so easily.

There are many causes why both parties often wish the contract of apprenticeship to be terminated. On the part of the masters there is a tendency to make servants and errand-boys of their apprentices rather than teach them their trade, and the Council of the Prud'hommes has often been called on to arbitrate in a dispute arising out of this cause. In this case the apprentice is placed under the supervision of a member of the council, who makes periodical visits to the shop where he is employed, to acquire ocular demonstration of his progress. Again, a boy who has been apprenticed for three or four years, of which he has completed two, if he is able and intelligent, will know that as a journeyman he could get 2 francs a day, while as an apprentice he only gets 20 sous. Immediately he has but one idea, to become a journeyman. He disobeys his master in order to be discharged; but, if that does not succeed, he runs away, and takes work in another workshop, thus compelling his master to look for him. And when the master has found him, he goes to the father and makes a complaint; but the latter takes the part of his son, and accuses the master of ill-treating him, and so on. Every day the Prud'hommes have before them cases of this description, and for this reason are anxious for the law to fix clearly the limits of responsibility, both of the masters and the parents. Moreover, the council can only be severe with the masters; when the boy and his parents break their engagement, and the master having had the trouble of teach-

Causes for premature dissolution of the indentures, with proposed remedy.

ing the boy loses the value of his labour just as he is capable of earning money, there is no remedy.

Action of the
charitable
societies for
the support of
apprentices.

M. Gouin believes that the action of the apprentice societies is productive of great good, as there are very rarely instances of disputes about the contracts of apprenticeship in which they have intervened. He instances as an example the establishment of St. Nicolas, which has already been described at p. 27 of this volume.

Watch and
clock-making
school.

M. Gouin recommends the establishment of a school of watch and clock making (*école réglementaire pour l'horlogerie de précision*). In general good watches are not made in France, and it is the exception to find a skilful workman; but, with a special school, he is sure that the horological manufactures of France could compete with those of Switzerland. He further recommends the formation of a school of naval architecture (*école de constructions maritimes*) in one of the ports of France, which should be for shipbuilders what the school at St. Etienne is for miners. He conceives that the pupils could attend school during a part of the day or the year, and during the other work as apprentices in the ship-building yards or dockyards of the arsenal. Unfortunately, naval construction is not far advanced in France, but such as it is, it is very difficult to find for it a sufficient number of skilled draughtsmen.

Increased em-
ployment of
machine tools.

On the whole, M. Gouin is of opinion that the common workman is fast disappearing, and it is now endeavoured to make artisans more intelligent and more highly educated rather than to have *workmen* in the common acceptation of the word. Mechanics, skilled in the use of hand tools were formerly necessary to the trade; but now that there has been such an advance in machine tools, skilled smiths and fitters are no longer necessary; nowadays it is much more easy and expeditious to forge large pieces under the steam hammer. In the same way we have now planing and slotting machines for fitting, and the workman has nothing to do but to bring the pieces together and to finish the whole.

*Evidence of Madame Pelleport, Directress of the Upper
Municipal School, Passage St. Pierre, Paris.*

Account of the
school.

This boarding school contains 48 pupils belonging to families of the small tradesman and workman class. They are admitted from 13 to 18 years of age. There are 22 scholarships, 11 being communal and 11 municipal; the former are obtained by a severe competition among the girls leaving the primary schools, the latter, on the contrary, are given by nomination. The other pupils, 26 in number, are

paying, the terms being 600 francs a year. All the pupils receive the same instruction in grammar, geography, a little literature, and an insight into ancient, Roman, and general history; under this head they cannot go very far, as the course of study extends only over three years. Singing, English, drawing, and bookkeeping are also taught; music is optional, and paid for separately. The instruction in drawing consists of linear and head drawing, but drawing of ornament applied to industry is not taught.

It would be difficult to say how this school can be called technical or professional. Though sewing is taught, it is not in order to make the pupils sempstresses by trade, but as a branch of education necessary to every woman. A great many of the pupils become mistresses at the municipal schools, and a few at private schools. It is the wish of Madame Pelleport to put her pupils in the way of getting their own living without becoming either sempstresses or governesses. The pupils are accustomed to domestic work, as they have to clean the dormitories, class rooms, &c., of the school.

Future career
of the pupils.

The school has its buildings rent free from the city of Paris. The household expenses and payment for seats in church amount to about 1,700 francs per month: 7,400 francs a year go in salaries to the teachers, and 900 francs in wages to the servants.

Finances.

Evidence of M. Houel, Manager of the Derosne Establishment, of Cail, and Co.

M. Houel says:—

“I shall commence with the question of the instruction of apprentices. I believe that in the provincial centres of industry, as Lille or Mulhouse, more favourable conditions could be created than at Paris. Thus at Fives, at the establishment of Parent, Schaken, Caillet, and Co., of which I am the fourth partner, we have begun to give special instruction to our apprentices, and doing this in the interest of the children and in that of the parents, we believe that it is also in the interest of our establishment.”

Importance of
an instruction
for apprentices.

“In fact, the provincial workshops are under quite different conditions from those in the capital. At Paris as many workmen as are wanted can be found. In the provinces, on the contrary, it is often difficult; we are compelled to create a staff of employés and operatives, who we wish may become attached to our establishment; we must attract both children and parents by making it easy for them to find dwelling places and schools close to their work. This is what we wish to effect, and in which we have already succeeded in many centres.”

Difficulty of
obtaining
work-people in
the provinces.

A school for apprentices attached to the workshop.

"Our establishment, founded now about three years, employs 1,500 to 1,800 men; we have 60 apprentices, and we are thinking of raising the number to 300 or 400. Our apprentices have one hour of intellectual labour, but we believe that to learn properly they should have four or five hours daily; we would willingly allow it to them, and we should probably arrive at an instruction which would qualify some of them to become candidates for the Schools of Arts and Trades, and that under conditions very favourable to their practical knowledge."

Inconveniences of evening classes.

"It has sometimes been spoken of to make workmen study at night; I believe that to be almost impossible. A man who has been at work all day cannot study, unless indeed he has an exceptional constitution; a man who has the care of a family, who works at piece work, and gives all his energy to it, has need of the evening for rest. According to my idea the working man cannot gain much by studying at night; he may go to his class one evening but he will not go again. It is the apprentice with whom we should occupy ourselves, because he is of an age to divide his time between manual and intellectual labour."

Educated workmen much required.

"Now a-days it is necessary to have educated workmen. France sends as many artizans abroad as England. When we have a workman to send to Italy or Spain we enquire what he knows, and we find that in general he is a thoroughly practical man who knows his work perfectly; but if we ask him to make a calculation, or to keep an account of petty cash, we directly discover his incapacity. On the other hand if we take a pupil from the schools, we find him less practical than the working man, less able on the whole to meet the requirements of the situation. In fact we are compelled to send in preference a man who is not educated, but who knows how to work. What is wanting then is a man capable of working and yet instructed, and it is therefore of the greatest importance to trade to promote the instruction of apprentices, by attaching a school to the workshop as we have done at Fives."

Doubling the number of apprentices in order that they may give up half their time to school.

"I confess I have here given utterance to an idea which deserves to be considered practically; it would be well to examine in detail what are the cases where a child, giving six hours of work a day to his master, can be replaced by another child while the first one goes to school. There are circumstances under which there would be some difficulty in making apprentices thus alternately go to work, but I think that in most cases it would be possible. Thus in a workshop like ours I do not see why we could not employ 200 apprentices as well as 30 or 40; in fact the majority merely work

as assistants to the workmen, and could easily be replaced in this work by others. It is only when a child has himself commenced a piece of work that it cannot be finished by another. But I think that this difficulty can be overcome by having twice as many children as are wanted for their work and by giving each of them only half of what he can do in twelve hours."

"I think then that it would be an excellent plan to organize in one large industrial establishment an intellectual training sufficiently advanced to allow of practical and scientific acquirements being placed on the same footing, and to enable parents who are sufficiently enlightened to send their children to the Schools of Arts and Trades. For my own part I know of no better instruction to make able workmen than that which is given at those schools, because there the studies run parallel to one another. We are indebted to them for the fact that in mechanical construction we are the equals of any other nation in Europe. We ourselves employ a great number of the pupils of these schools. Of the 300 who pass out of them every year, there are some who are more or less not so well prepared; there are some of whom we can make nothing but workmen, sometimes even only moderately good workmen; but there are others who are very intelligent, and have profited to the utmost by the intellectual and scientific training they have received. Such as have not been able to learn mathematics, but possess practical capabilities become excellent foremen; we meet with men among them who have a great liking for practical acquirements, because in general they are good draughtsmen. A young man who can work well and is skilful with his hands is also a good draughtsman, and that is one of the first qualifications of a good foreman.

Influence of the Schools of Arts and Trades on the mechanical industry of the country.

"We are all the more in a position to feel the want of workmen who have a knowledge of drawing, in that our method of manufacture (which we owe to the Schools of Arts and Trades) is quite different to that adopted in England, and to that which for a long time was in use in France. I am the manager of two works, those of Messrs. Cail & Co. and those of Messrs. Parent, Schaken, Caillet & Co., which employ together about 5,000 hands; that number might be easily increased to 50,000, if we had a sufficiency of draughtsmen. Our method consists in giving full details of every work piece by piece, so that the workman has only to execute the piece according to the drawings which are confided to him. With a large staff of draughtsmen we produce works at these establishments to the amount of over thirty millions of francs, which would be an impossibility without our means and process of manufacture."

Value of draughtsmen.

Inconvenience attending apprenticeship in large workshops.

“ It must be acknowledged that in large workshops apprentices are not in such favourable circumstances for learning their trades as in smaller ones: establishments with large capital undertake considerable contracts, and are therefore compelled to make many things of the same description. In a small workshop, on the contrary, where they execute a variety of works, the same objects are not turned out in so large a number. We manufacture in our three establishments 150 locomotives, and we could make 200; there are therefore many parts which are repeated. If a young man executes well a piece of work which is intrusted to him, it may happen that he has given to him the same work for a year or more and he will be able to make a profit by it: in a pecuniary point of view it is at once the interest of his employers, of his parents, and of himself that he should continue for some time manufacturing the same thing.

Shortcomings of the instruction given at the Schools of Arts and Trades.

“ In the Schools of Arts and Trades this method is not adopted; there the pupils are made to execute works which are gradually made more and more difficult, so that their acquirements may increase gradually. But this mode of instruction has also its inconveniences, for the result is that the pupils cannot produce their work rapidly. They ought to execute in these schools a greater quantity of work, and to have among the pupils a number of skilled mechanics to show them how to turn out their work quickly. We take every year fifteen pupils from the school at Châlons, and as they are much sought after we do our best to obtain the best. For two years they are employed in our workshops, and are then sent into the drawing office; at the end of four or five years they are of great service to us. But it is evident that if they were more conversant with manual labour when they leave school, they would not have to pass two years in the workshop; they could be spared that probation, and would be sooner in a position to occupy higher posts. Works of greater importance ought to be executed in the schools; and if by the side of the pupils there were a few picked workmen who knew how to turn out work well, they would serve as an example to the young men of the school, and those who possessed industry and ability would endeavour to emulate them in rapidity of execution and skill.”

LONDON:

Printed by GEORGE E. FYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty.

For Her Majesty's Stationery Office.

